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. . . ball and roller bearings, performance standards — pages 132; 137

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Standards

Standardization is dynamic, not static. It means not to stand still, but to move forward together.

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SKF Industries, Inc

Our Cover: Two new American Standards for ball and roller bearings give standard methods of rating load-carrying capacity of bearings and specify performance characteristics for precision instrument bearings (pages 133; 137).

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• FROM TINY BALLS no bigger than a pinpoint to huge bearings so big they must be shipped in especially constructed packing cases, ball and roller bearings make the machines and instruments of industry run smoothly. This issue features two basic new American Standards that contribute to the high degree of reliability required of all components today (pp 133 and 137). One provides a system of load ratings for both ball and roller bearings, and testing by both the static and dynamic methods. The other specifies basic characteristics, dimensions, including the new inch miniature series, internal radial clearances, and other provisions that affect high-precision bearings used in instruments.

• THE TENTH NATIONAL CONFERENCE on Standards will concentrate on showing how standards help counteract the "profit squeeze." The conference will be held October 20, 21, and 22 at the Sheraton-Cadillac Hotel in Detroit. Among the subjects tentatively planned are: the significance of automobile design standards to the consumer, standard highway markings and traffic control measures, materials specifications and testing as related to design standards, and the building-block method of standardization as an aid to automation.

Roy P. Trowbridge, General Motors, is chairman of the program committee.

After an opening session, two concurrent sessions will be held mornings and afternoons in order to cover as many subjects as possible.

• WORD HAS JUST BEEN RECEIVED from the International Organization for Standardization that American Standard Z11.83-1956, Petroleum Measurement Tables, has been accepted as an International Recommendation. The Petroleum Measurement Tables have been a joint standard of the American Society for Testing Materials (ASTM D-1250) and the Institute of Petroleum, London, England (IP-200) since 1952. Subsequently approved as American Standard, they were submitted to ISO, approved, and are now being published as ISO Recommendation 91. Their international recognition is a source of satisfaction to petroleum technologists in this country and in England, according to a spokesman of the API.

This Month's Standards Personality

MERWIN M. BRANDON, known as "Money" to his friends, took office as president of Underwriters' Laboratories April 24. Satisfaction and pleasure that his outstanding abilities—technically, in his relations with people, and in an administrative capacity—have been thus recognized, is the general reaction among those who know him.

Mr Brandon has been with the Laboratories for 38 years. In 1921 he became an assistant engineer in the gases and oil department, and has served successively as factory inspector, service engineer, chief inspector, associate electrical engineer, vice-president and electrical engineer, and vice-president in charge of eastern operations. As president he has transferred his headquarters from New York to Chicago.

Mr Brandon was graduated with a B. S. degree in Electrical Engineering from Mississippi A&M College in 1919, and followed with an E. E. degree from Mississippi State College in 1936. He is a licensed professional engineer in California, Illinois, and New York where Underwriters' Laboratories have testing stations, and is a member of Tau Beta Pi and the honor society, Phi Kappa Phi.

After teaching at Mississippi A&M College for the Veterans' Administration in 1920, he went to Westinghouse Electric Manufacturing Company, where he completed the Graduate Student Apprentice Course in 1921. From there he went directly to Underwriters' Laboratories.

Working with the Laboratories, known throughout the world for the UL seal of approval on electrically safe appliances and equipment, Mr Brandon naturally has a deep interest in standards. He has worked with the American Standards Association for many years—as a member of the Standards Council, the Electrical Standards Board, and the United States National Committee of the International Electrotechnical Commission. For the past five years he has been chairman of the influential Committee on Procedure.

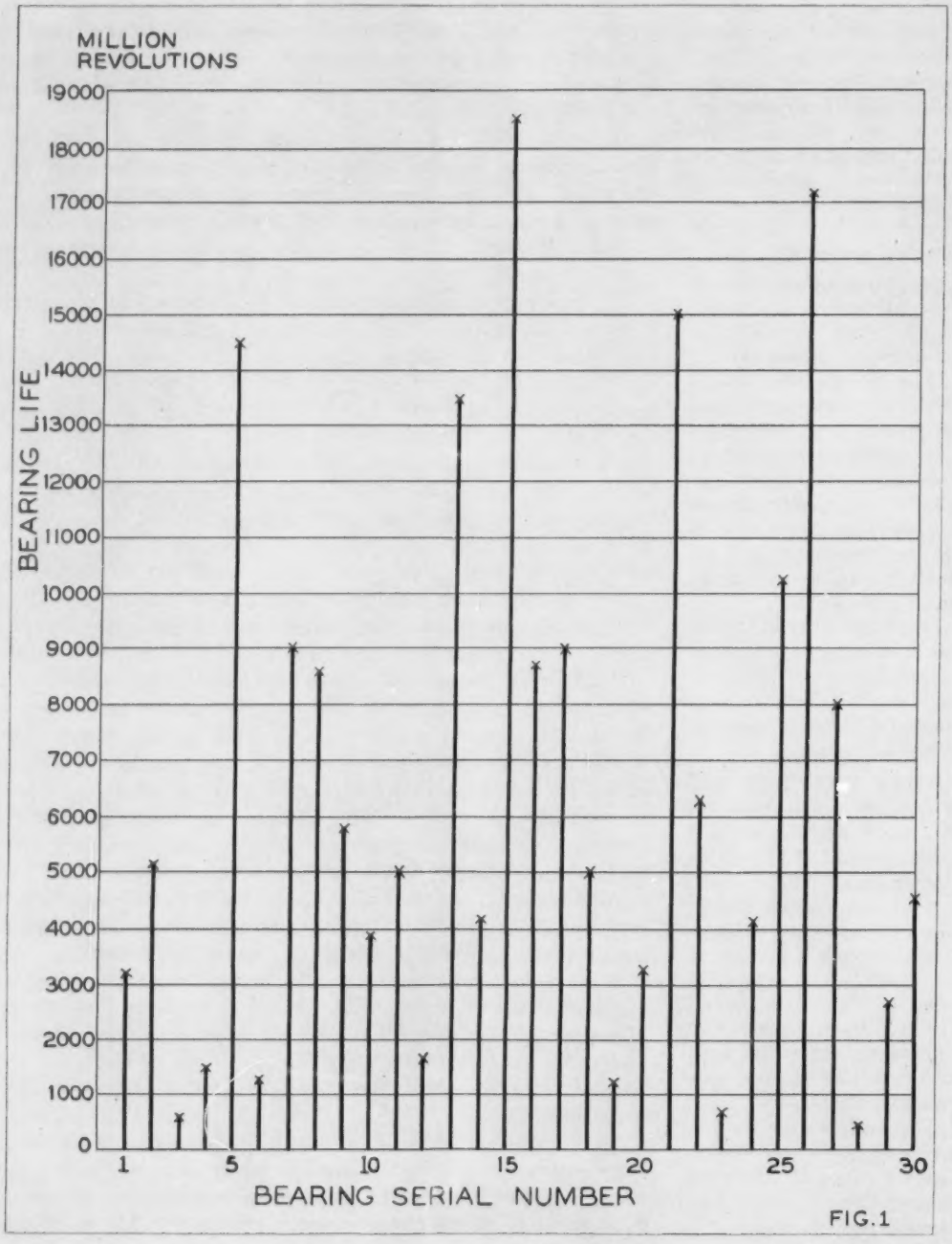
ASA is not the only organization that has claimed Mr Brandon's time and energy. He is a Fellow of the American Institute of Electrical Engineers and has been chairman of the AIEE Domestic and Commercial Applications Committee, the Technical Program Committee, and the Standards Committee. He is now a member of the Institute's Standards Committee and of its Safety Committee, and is chairman of the Subcommittee on Outside Organizations Activities of the Technical Operations Department. He is the AIEE representative on the Industry Committee on Interior Wiring Design.

Mr Brandon is also a member of the National Fire Protection Association and is chairman of the Electrical Section, the Electrical Field Service Committee, and the National Electrical Code Committee. This is the committee responsible for preparation of the National Electrical Code, successive editions of which have been approved by the American Standards Association with the designation C1.

Mr Brandon and his wife, the former Frances Bahin of Natchez, Mississippi, have a son, Merwin, Jr, and a grandson, Merwin, III. In Connecticut, where they have lived since 1928 until the present move to Chicago, they have been active in church and community affairs, with Mr Brandon's special hobbies centering on sailing and gardening.

American Standard B3.11-1959, Method of Evaluating Load Ratings for Ball and Roller Bearings, is now being published. Copies may be ordered from the American Standards Association at $1.75

Figure 1. Experiments show that the lives of apparently identical bearings vary considerably. This figure shows the results when thirty single-row bearings, each given a serial number, were run under normal load until fatigue developed. See also Table 1, Column 2, (page 135), for comparative life records.



BALL AND ROLLER BEARINGS

How to Check Their Load-Carrying Capacity

by GUNNAR PALMGREN

IN MODERN INDUSTRY, ball and roller bearings are used to support rotating parts in almost every kind of equipment from delicate instruments to the heaviest steel rolling mills. The loads may range from fractions of an ounce to several million pounds per bearing.

The load-carrying capacity and expected fatigue life of such bearings are matters of considerable complication. For lack of something better, bearing manufacturers originally developed and applied their own methods of evaluation, using empirical formulae based on limited testing and general experience. As a result, there sometimes were marked differences among the capacities claimed by different companies for the same type and size bearing, causing confusion among bearing users.

In 1945, in an effort to bring order into this situation and at the urging of some bearing users, the Anti-Friction Bearing Manufacturers' Association (AFBMA) started an active study of the problem of developing a uniform and consistent method of evaluating load ratings of ball and roller bearings based on the best information available. This work has been successful in several respects. It has already led to a partial reduction of the confusion, and has finally resulted in the approval by the American Standards Association of a new American Standard: B3.11-1959, Standard Method of Evaluating Load Ratings for Ball and Roller Bearings.

This standard, which covers dynamic as well as static capacity of ball and roller bearings of radial and thrust types, can be used by bearing manufacturers and users alike, and should be the desired uniform basis for bearing ratings.

MR PALMGREN, vice-president of SKF Industries, Inc, is chairman of Subcommittee 7 on Load Ratings of ASA Sectional Committee B3, Ball and Roller Bearings. Mr Palmgren is the spokesman for the United States in the work on load ratings being done by the International Organization for Standardization's Technical Committee 4 on Ball and Roller Bearings. He is the American representative on Working Group 3, Load Ratings, of ISO/TC 4.

After having served under the sponsorship of ASA's Mechanical Standards Board for many years, Sectional Committee B3 has now been changed to the sponsorship of the Anti-Friction Bearing Manufacturers' Association. R. H. Valentine, chief engineer, New Departure Division, General Motors Corporation, Bristol, Connecticut, is chairman of Sectional Committee B3. H. O. Smith, secretary-manager, Anti-Friction Bearing Manufacturers' Association, is secretary of the committee.

Prior to 1947, every attempt to correlate actual fatigue life with material stresses had failed. However, it was known that this problem was being intensely studied by specialists in Europe; therefore, close international contacts were established through the Secretariat of Technical Committee 4 (TC 4) of the International Organization for Standardization (ISO).

A great stride toward a solution of the problem was accomplished when a new comprehensive mathematical treatment, "Dynamic Capacity of Rolling Bearings," was published by G. Lundberg and A. Palmgren in *Acta Polytechnica*, No. 7, 1947 [1]. A resumé of this was also presented at the November meeting of the American Society of Mechanical Engineers, 1948 [2]. A supplement, "Dynamic Capacity of Roller Bearings," dealing primarily with roller bearings and modifying some of the original work, was published in *Acta Polytechnica*, No. 96, 1952.

By introducing the material shear stress at a critical depth below the surface and the volume of material subjected to stress, and by using a statistical method, correlation between theory and test results was obtained.

This advance led to continued close cooperation with ISO/TC 4, and to an AFBMA standard covering ball bearings, published September 1949 (revised November 1950). In October 1951, ASA Sectional Committee B3 reviewed proposals received from AFBMA and the Secretariat of ISO/TC 4. This resulted in a broadening of the study. A considerable amount of additional ball bearing test data was made available by several bearing manufacturers. It was also felt that the statistical method and numerical values of exponents obtained by Lundberg-Palmgren should be commented on and checked against these additional test data by the Statistical Laboratory of the National Bureau of Standards in Washington, D. C. Their observations and findings were published by J. Lieblein and M. Zelen [3] in 1956. They concluded that the exponent values determined by Lundberg-Palmgren were acceptable.

In addition to the above, test data relating to single-row ball bearings under various combinations of thrust and radial load were made available by several manufacturers, causing a slight revision of factors used to convert combined load into equivalent radial load for this type bearing. This and some other modifications were included in the AFBMA standard as revised August 1957.

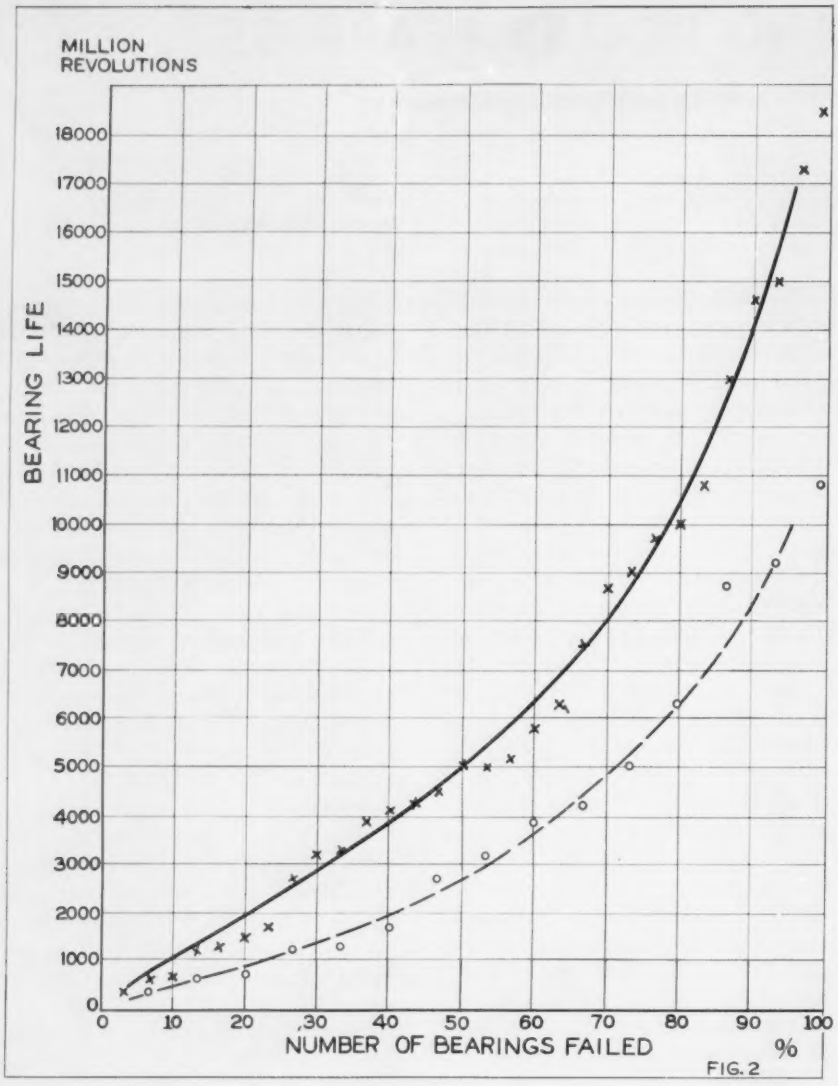


Figure 2. Results of the experiment shown in Figure 1 rearranged in order of bearing life. Crosses stand for the figures shown in Column 5 of Table 1. Repeated tests of large groups of bearings give the same general shape as this dispersion curve.

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Table 1

Col: 1	2	3	4	5	6	7
Bearing No.	*LIFE million rev*	*LIFE million rev*	*Bearing No.*	*LIFE million rev*	*Bearing No.*	*LIFE million rev*
1	3200	3200	28	400	27	400
2	5100		3	600	28	
3	600	600	23	700	3	600
4	1500		19	1250	4	
5	14600	1300	6	1300	23	700
6	1300		4	1500	24	
7	9000	8700	12	1700	19	1250
8	8700		29	2700	20	
9	5800	3900	1	3200	5	1300
10	3900		20	3300	6	
11	5000	1700	10	3900	11	1700
12	1700		24	4100	12	
13	13500	4200	14	4200	29	2700
14	4200		30	4500	30	
15	18500	9200	18	5000	1	3200
16	9200		11	5000	2	
17	9500	5000	2	5100	9	3900
18	5000		9	5800	10	
19	1250	1250	22	6300	13	4200
20	3300		27	8000	14	
21	15000	6300	8	8700	17	5000
22	6300		21	9000	18	
23	700	700	16	9200	21	6300
24	4100		17	9500	22	
25	10800	10800	25	10800	7	8700
26	17300		13	13500	8	
27	8000	400	5	14600	15	9200
28	400		21	15000	16	
29	2700	2700	26	17300	25	10800
30	4500		15	18500	26	

In the meantime, AFBMA, again in cooperation with ISO/TC 4, studied similar problems concerning roller bearings, resulting in an AFBMA Standard Method of Evaluating Load Ratings of Roller Bearings, published March 1956 (revised December 1957).

Methods of evaluating static load ratings have been included in the above AFBMA standards. These static ratings were primarily based on work done by A. Palmgren, G. Lundberg, B. Anderson, and E. Bratt [4], as well as original work done by A. Palmgren [5] in developing adequate test equipment.

The ISO/TC 4 activity has resulted in:

1. ISO Recommendation No. 76, Ball and Roller Bearings, Method of Evaluating Static Load Ratings

2. Draft ISO Recommendation No. 278, Ball and Roller Bearings, Method of Evaluating Dynamic Load Ratings.

The new American Standard and the ISO Recommendations are identical except that in the American Standard the numerical values of one coefficient applicable to some types of roller bearings are more specifically delineated.

The American Standard contains definitions of bearing life, basic load rating, equivalent load, basic static load rating, and static equivalent load. It also gives formulae for calculating these for different types and sizes of bearings.

Some observations may be of interest.

Static Load Rating

The static load is defined in the standard as a load acting on a nonrotating bearing. Permanent deformations appear in the rolling elements and raceways under static load of moderate magnitude and increase gradually with increasing load. The permissible static load is, therefore, dependent upon the permissible magnitude of permanent deformation.

In the standard the static load rating is defined as the static load which corresponds to a total permanent deformation of rolling element and race at the most heavily stressed contact of 0.0001 of the ball or roller diameter.

In certain applications, where subsequent rotation of the bearing is slow and where smoothness and friction requirements are not too exacting, a much greater total permanent deformation can be permitted and the static load, consequently, may be several times higher. As an example, established load ratings of aircraft control bearings are much higher than the static load rating obtained from American Standard B3.11-1959. Likewise, where extreme smoothness of operation is required or friction requirements are critical, less total permanent deformation and less static load than obtained from B3.11 may be tolerated.

The Life of an Individual Rotating Bearing

If a bearing is correctly mounted, lubricated, and otherwise properly handled, all causes of failure are eliminated, except one — the fatigue in the material. The effect of this fatigue is the flaking which starts as a crack and develops into a spalled area on one or the other of the load-carrying surfaces.

The standard defines the life of an individual bearing as the number of revolutions (or hours at some constant speed) which the bearing runs before the first evidence of fatigue develops.

Dispersion of Bearing Lives

If a number of apparently identical bearings are run under equal load and speed, it will be found that their lives vary considerably. As an example, reference is made to Figure 1. Thirty single-row bearings, each given a serial number, were run under normal load until fatigue developed. The lives obtained are indicated in the diagram; also in Table 1, Column 2. The main reason for this life dispersion is that the material is not homogeneous. The life of each bearing depends on the extent and location of weak points in the material. As this is unpredictable, the life of an individual bearing cannot be predetermined. However, the results can be dealt with statistically.

By rearranging the results in order of bearing life, Column 5 in Table 1 is obtained. This column is graphically illustrated by the crosses in Figure 2, from which it is found that the lives obtained conform rather closely to the curve drawn as a solid line. Repeated tests of sufficiently large groups of bearings give the same general shape as that of this dispersion curve,

which thus can be used as a basis for statistical life predictions.

The Term "Rating Life"

While it is impossible to predict the life of an individual bearing on a large group of identical bearings, run under the same conditions, the percentage which will survive to a predetermined life can be closely estimated. In order to insure that bearing applications will meet both practical and economic requirements, bearing selections are made on the basis of a 90-percent probability of survival to a predetermined life. Consequently, the "rating life" or briefly "life" defined by the standard is that number of millions of revolutions or the number of hours at a constant speed that 90 percent of a group of identical bearings will complete or exceed before the first evidence of fatigue develops.

The "Basic Load Rating"

The standard defines the "basic load rating" as that constant stationary radial load (radial bearings) or central thrust load (thrust bearings) which a group of apparently identical bearings with stationary outer ring can endure for a "rating life" of one million revolutions.

This "basic load rating" is a function of the geometry of the component parts, the number of rows of balls or rollers, the number and diameter of the rolling elements, and, in the case of rollers, the length of roller contact with the rings. It also depends on the so-called contact angle and the properties of the material used. The standard delineates in table form the effect of the geometry of contact between rolling elements and rings, and gives exponents to be used for the number, diameter, and length of rolling elements.

Contrary to what may first be expected, the load-carrying capacity is not directly proportional to the number of rows of rolling elements or to the length of rollers. For example, a double-row bearing does not have twice the capacity of a single-row bearing with the same size and number of balls or rollers per row. As the volume of material under stress increases with the number of rows or length of rollers, the probability of a weak point in the material being subjected to stress increases.

To illustrate, reference is again made to Table 1, Column 2. If it is assumed that the single-row bearings 1 and 2 constitute one double-row bearing (this assumption would apply also to bearings 3 and 4, and so on), the lives of these double-row bearings would be those shown in Column 3. Rearranging the values in order of lives obtained, the result will be that shown in Column 7 and by the circles and dotted line in Figure 2. The lives of the double-row bearings will be shorter than those of the single row, even though the load per row is the same in both cases. This means, of course, that the double-row bearings have less than twice the capacity of the single row. The standard takes conditions of this kind into account.

In most bearings the material stress in one ring is greater than that in the other. However, this does not mean that the more heavily stressed ring will always fatigue first. The number of stress cycles on each ring is different. Also, a ring subjected to less stress but weakened by some discontinuity in the material may flake before a more heavily stressed ring in which the material is not weakened to a similar extent. The combined probabilities of flaking of either ring or of some rolling element constitute the probability of a bearing failure.

These conditions are dealt with statistically and accounted for in the standard.

The Effect of Load on Bearing Life

If several groups of identical bearings are run under loads of different magnitude, the life that 90 percent of the bearings of each group will attain or exceed (the "rating life") will be shorter, the higher the load is. If the results are plotted on a logarithmic diagram, it will be found that the points representing these rating lives fall approximately on a straight line. This means that the exponent of the load-to-life relationship, indicated as p, is constant. The relevant formula in the standard, called the "life formula," is:

$$L = \left(\frac{C}{P}\right)^p$$

where L = rating life in million revolutions
C = basic load rating
P = (equivalent) bearing load

In the past, different values of the exponent p have been used. For ball bearings, the most common one has been $p = 3$ and in one case $p = 4$. For roller bearings $p = 3$ and $p = 10/3$ have been used.

Based on all available test data, the standard finally established the following values:

For ball bearings $p = 3$
For roller bearings $p = 10/3$

Equivalent Load

Bearings are frequently subjected to a combination of radial and thrust loads. In such cases it is necessary, for the purpose of calculating the expected life, to convert his load combination to a so-called "equivalent load." This is defined in the standard as that constant stationary radial load (for radial bearings) or thrust load (for thrust bearings) which, if applied to a bearing with rotating inner ring and stationary outer ring, would give the same life as that which the bearing will attain under the actual condition of load and rotation.

The standard contains formulae and numerical values of coefficients required for obtaining this equivalent load.

The new standard is a valuable contribution to the art of rating bearings. It gives the users a basis for an impartial comparison of bearings of different designs and manufacture. It is also hoped that all bearing manufacturers will follow this standard when establishing load ratings for various company publications, thereby eliminating present confusion and aiding the users in selecting the right bearing in each instance.

Figure 1. One of the typical applications of instrument bearings is in gyro rotors, shown here.

PRECISION—THE GOAL FOR INSTRUMENT BEARINGS

by THOMAS E. ROUNDS

MR ROUNDS, vice-president and chief consulting engineer of the Barden Corporation, Danbury, Connecticut, is chairman of Subcommittee 8 on Instrument Bearings of Sectional Committee B3, Ball and Roller Bearings. Mr Rounds is member-at-large on the sectional committee. He is chairman of Working Group 6 on Instrument Bearings of ISO Technical Committee 4 on Ball and Roller Bearings. Mr Rounds is secretary of the Instrument Precision Ball Bearing Committee and secretary of the Subcommittee on Technical Standardization of the American Ordnance Association. He is also a member of the Annular Bearing Engineers Committee, Anti-Friction Bearing Manufacturers Association.

APPROVAL OF A NEW AMERICAN STANDARD recognizing the special characteristics required of instrument precision ball bearings calls renewed attention to the role of the precision ball bearing in today's advanced components and mechanisms, particularly in aircraft and missiles where the concept of reliability is receiving tremendous emphasis. While the standard itself is no guarantee of reliability, the principles it establishes should help to set the pattern for continually improved bearing performance. Ultimately, this should go far toward eliminating that one chance in a hundred

Figure 2. Tiny instrument bearings must perform with a high degree of accuracy when used in precision gear trains for computers.

thousand that an instrumentation device will show bearing malfunction under its expected operating conditions.

The American Standard Requirements for Instrument Precision Ball Bearings, B3.10-1959, completed during the summer of 1958 by Sectional Committee B3, Ball and Roller Bearings, was given final approval as American Standard in January 1959.

Abroad, this standard has been given consideration also in international work on bearings. In its final draft stage, it was reviewed by a working group on instrument bearings of Technical Committee 4, Ball and Roller Bearings, of the International Organization for Standardization. Considerable interest in the new Proposed American Standard was shown at the 1958 Naples meeting of ISO/TC4, as similar requirements in other countries had been increasingly observed. It is quite possible that within a few years international standardization of instrument "rolling contact" bearings may be reached.

A result of nearly eight years of work by the Instrument Precision Ball Bearing Committee of the American Ordnance Association, the new standard sets forth basic characteristics, tolerances, size classifications for selective assembly, internal radial clearances, and the dimensions of two series of open and shielded bearings in both unflanged and flanged constructions.

The term "instrument ball bearings" covers those ball bearings having highly refined dimensional and performance characteristics of the kind currently needed in high volume for use in systems and components for ground, marine, and airborne navigational and ordnance equipment of many diverse types. Techniques developed in producing these bearings have also led to an increase in civilian use for high-performance aircraft accessories and lately in the computer and dental fields where their ability to operate reliably and smoothly at high speeds makes their use attractive.

Typical applications of instrument bearings include gyroscopes for spin mass and gimbal support, for synchros, resolvers, small servomotors, computer gear trains, recording devices, sensitive potentiometers, optical mechanisms, and magnetic recorders of various types. Figures 1, 2, and 3 illustrate typical uses.

The need for a separate standard for instrument bearings, as opposed to the original four tolerance grades of ball bearings that have been in existence for many years, is evident from a review of what the ABEC tolerances spell out and what instrument bearings are called upon to provide in addition.

Figure 3. Ultra-low torque potentiometers, highly sensitive mechanisms also require the use of precision instrument bearings.

The ABEC tolerances are fundamentally dimensional. Four tolerance grades have been approved as American Standard[1] by ASA so far, ABEC 1, 3, 5 and 7, with the larger numbers indicating progressively greater accuracy and scope. Thus, ABEC 1 stipulates certain tolerances on bore, outer diameter (O.D.), ring width, and radial runout; and ABEC 3 refines these limits to closer values. ABEC 5 and 7 cover a greater scope, including parallelism and squareness errors. ABEC 1 enjoys widest industrial use, including automotive, with the higher tolerance grades specified for more exacting mounting dimensions and running accuracy. ABEC 5 and 7 bearings are predominantly used on machine tool spindles. However, radial internal clearance is covered by other standards, and performance requirements for such characteristics as quiet running, and specific preload values are matters of individual specification between bearing user and supplier.

In contrast to bearings used in most industrial applications, instrument bearings are seldom loaded to the point where fatigue life is of great concern. Static capacity is important, however, as shock and vibration loading conditions can become serious, particularly on gyro gimbal support systems where bearing speeds are low and the least tendency to "brinell" will cause the development of high restraining torque peaks and false "signals" in the system.

Lubrication is a serious problem, particularly for instrument bearings used in synchros and servomotors which operate in increasingly higher ambient temperatures, some approaching 450 F. Low-temperature starting requirements are also severe, the usual specifications requiring ability to respond with equipment cooled to temperatures of –65 F or lower.

Materials used for instrument bearing rings and balls include SAE 52100 chrome bearing steel and increasingly AISI 440C stainless steel to resist corrosive influences that deteriorate performance in service. Whereas prior to World War II stainless steel ball bearings were used mainly in gasoline pumps and in the chemical industry, today we see these bearings made in high precision with performance characteristics almost identical with those of 52100 steel bearings. While stainless steel is inherently more difficult to machine and grind, techniques have progressed along with the demand so that today we see almost equal use of these two types of ring and ball material.

Even more important than these factors, however, are the higher levels of components' operational perform-

[1]B3.5-1951, Tolerances for Ball and Roller Bearings.

Figure 4. Torque and vibration tests are important functional checks on quality of instrument bearings. Such performance testing, often done on specially designed instrumentation devices, is essential to determine whether bearings meet operational requirements.

ance which call for specific functional characteristics in instrument ball bearings. For example, sensitive, uniformly low restraining torque is required for gyro gimbals and synchro repeating devices; generally low torque and very exacting control of radial play and accumulated runout errors are needed for computer gear trains having high accuracy and minimum backlash; low noise levels are requisites for servomotors and tape recorders. For inertial gyro rotors, to prevent more than a minimum shift of the center of gravity of the spin mass the bearings must have closely controlled yield rates, both radially and axially.

Such needs as these require far more in terms of performance—and in manufacture—than normal industrial applications. To pre-test the fulfillment of performance requirements, extensive functional testing is employed, in addition to an extremely close control over boundary and internal dimensions. Examples of the functional test instrumentation required are shown in Figure 4.

To achieve full advantage of their high accuracy, low torque, and smooth running qualities, instrument bearings must be scrupulously clean. This demands special environmental facilities for bearing inspection, assembly, and final performance testing. Such facilities must be of the super-clean, "white room" type shown in Figure 5, with provision for dust-free atmosphere and low relative humidity. For washing, specially designed spray cleaning devices using filtered solvents are most essential, as the finest particle of foreign matter can result in malfunction if present in critical contact areas of raceways. If the bearings cannot be properly cleaned, all prior care taken in precise machining and grinding operations can be completely nullified.

It was first evident at the beginning of World War II that there was a need for instrument bearings beyond the supply available from existing sources—either foreign or domestic. To supply the bearings needed for a host of new fire control and navigational devices, new manufacturing facilities were established. The demands were finally met, but time did not permit a systematic approach to the common understanding needed to define realistic performance requirements or standards.

Following World War II, instead of a diminution in the need for instrument bearings, it was soon evident that bearings of even better dimensional and performance quality were needed. As the international situation became more tense, military requirements were increased to meet needs of faster, higher flying aircraft and the beginning of the missile space era.

Figure 5. Manufacture of instrument bearings demands absolute cleanliness, including control of dust and humidity. Certain super-critical work must be done in cabinet-type benches which provide additional air filtering and slight outward air flow to keep out dust.

Just before the Korean conflict broke out, military authorities felt that World War II history must not be repeated. The American Ordnance Association was asked to study the situation and make recommendations. In 1950, the Instrument Precision Ball Bearing Committee was organized under the chairmanship of the late F. E. Ericson. Early studies of this committee, which was composed of representatives of military services, instrument builders, and bearing producers, soon resulted in a report on the need for additional high-precision facilities. The report stated that downgrading of operational requirements was not realistic in the face of increased performance needs, and that standardization of basic performance and accuracy concepts was badly needed.

A subcommittee was appointed to study problems of friction torque measurement and to recommend a standard instrument and procedure to replace the many different types and practices in use in instrument and bearing manufacturers' plants. When the subcommittee was unable to agree upon one single existing instrument, a military task group of the Department of Defense developed a device for measuring, continuously and accurately, the torque characteristics of ball bearings. After much cooperative study and testing, MIL STD 206A was finally accepted by the AOA Instrument Precision Ball Bearing Committee subcommittee as a referee test method and specification for the instrument.

Another subcommittee on technical standardization was appointed in 1954 to study other instrument bearing requirements and characteristics, including dimensional standardization of miniature range bearings, then becoming an important factor due to the drive of the armed services for miniaturized components.

Early in 1955, agreement was reached on the scope of a proposed American Standard that included basic characteristics, dimensions of the new inch miniature series, internal radial clearances, ABEC tolerance grades pertaining thereto, and a system of classification of bore and O. D. size for selective assembly with mating shafts and housing members. Data covering AOA agreements were reviewed by the Annular Bearing Engineers Committee (ABEC) of the Anti-Friction Bearing Manufacturers Association and after their review and Comments, the first draft of the Proposed American Standard Requirements, B3.10, was prepared in 1956, leading to the final approval obtained in 1959.

Copies of American Standard Requirements for Instrument Precision Ball Bearings, B3.10-1959, are available at $1.00 each from the American Standards Association.

Cut Out Those Ladder Accidents

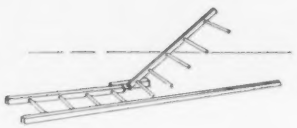
by ALAN D. FREAS

IT MAY NOT BE POSSIBLE to eliminate all ladder accidents, but the American Standard Safety Code for Portable Wood Ladders offers a guide to their construction, care, and use that should make possible reasonable safety. The fourth edition of this standard has just been issued after about two years of study and consultation by a committee of manufacturers, insurance groups, labor, safety, and government people. First issued in 1923, with the American Society of Safety Engineers, then the Engineering Division of the National Safety Council, as sponsor, the code has been revised four times. Now the work is being done with the American Ladder Institute, the American Society of Safety Engineers, and the National Association of Mutual Casualty Companies as sponsors.

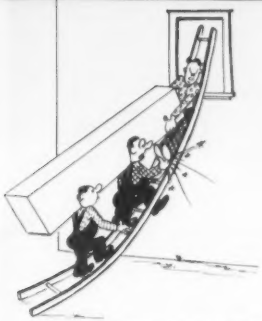
The standard provides rules and minimum requirements that will insure safety when the common types of portable wood ladders are used under normal conditions. It is not only designed to be used as a guide to state authorities or other regulatory bodies in the formation of laws or regulations. It is also recommended as a basis for purchasing requirements and in manuals, safety practices, and posters for instruction in personnel training. The standard gives information on the materials to be used in manufacturing the ladders, including limitations on the irregularities that may be permitted in the steps, side rails, and other parts—and tables with information on the various species of wood acceptable. It also provides construction requirements for the different types of ladders. One entire section explains the precautions that should be taken when storing wood ladders, how to care for them, and how to use them safely.

The revision just issued not only brings the code up to date but also improves its effectiveness by clarifying some of the points on which uncertainty has existed in the past.

Questions have frequently been raised as to the intent of the code in relation to deviations from the minimum dimensions specified for ladder parts. For example, if a manufacturer wants to use a side rail thicker than the minimum, is he entitled to reduce the width in com-



MR FREAS is assistant to the director of the Forest Products Laboratory, Forest Service, U. S. Department of Agriculture, and is chairman of the subcommittee of Sectional Committee A14 *that developed the revised American Standard Safety Code for Portable Wood Ladders,* A14.1-1959. *The Laboratory is maintained at Madison, Wisconsin, in cooperation with the University of Wisconsin.*



Drawings from U.S. Forest Service Forest Products Laboratory

pensation? If he does so, can it still be considered that he is complying with the code requirements? Clarification of this point in the revised edition should simplify the problems of administration.

In the construction requirements, the new edition provides for the use of angle braces at the ends of the longer steps of stepladders. This was done primarily to strengthen and stiffen the long steps. In addition, however, the over-all rigidity of the longer ladders will be somewhat improved. Additional methods of bracing the back sections of stepladders have been described, and measures to reduce the possibility of splitting the back leg at the hinge pin have been added.

In addition to changes such as those indicated above, a considerable number have been made that clarify the wording and the intent, based on past experience with the code. Others modify material and construction requirements. The current revision is a forward step in the development of effective and meaningful safety codes, the committee believes.

The function of the standard is to provide a guide to good practice in both the manufacture and use of portable wood ladders. The code has, of course, no legal standing in itself. It has nonetheless gained recognition and force through voluntary adoption by manufacturers and through inclusion, sometimes by reference, in the rules of regulatory bodies.

Some manufacturers, notably members of the American Ladder Institute, have adopted the code as a guide and generally manufacture ladders to conform to its requirements. Increased recognition of the code has been the result of advertising, particularly by the Institute, which emphasizes its value as a guide and urges buyers to insist on ladders made in conformance with its requirements. Many product labels indicate such conformance.

The first code was developed under the auspices of the American Engineering Standards Committee, which in 1928 became the American Standards Association. It was issued in October 1923 as a tentative American Standard in the form of Bulletin No. 351 of the Bureau of Labor Statistics, one of the Safety Code Series of the U. S. Department of Labor.

Experience gained in the manufacture and use of ladders in accordance with the original code led to a revision that was approved and issued by ASA in 1935 as American Standard A14-1935. Further revision was begun in 1939, but, in common with many projects, it was interrupted during World War II because other work had higher priority.

Up to this time, the codes had included ladders of all types, although they had been pointed primarily at wood ladders. It became apparent that the development of portable metal ladders was such as to merit separate consideration. Accordingly, a revision issued in 1948 was limited to wood ladders, with the intent that fixed ladders and portable metal ladders would be covered in separate documents.

At the first meeting of the reorganized committee in 1951, three subcommittees were established to formulate standards for the three general classes of ladders —portable wood, portable metal, and fixed. A revision of the code for portable wood ladders was approved in 1952, and the first codes for portable metal ladders and fixed ladders were issued in 1956.

Proposals for revision of the 1952 code were initiated by the American Ladder Institute. This was followed by a considerable series of informal meetings to explore the intent and practicality of the proposals and by two formal meetings of the subcommittee in June and December 1957 to complete a revision that could be submitted to the full sectional committee.

The revised edition was completed by the committee and submitted to the American Standards Association for approval late last year. It was approved as American Standard January 2, 1959.

Requirements for industrial safety are commonly controlled by the regulations of an industrial commission or similar body in the various states. A recent survey indicates that this American Standard safety code has been adopted in whole or in part in the regulations of a substantial number of states and is considered to be the governing authority by a number of others not having regulations specifically covering ladder safety.

The achievement of ladder safety is not a one-way street; the manufacturer and the user both share the responsibility. It is generally recognized that the manufacturer has the responsibility of producing a safe ladder. It seems to be not so obvious that the user also has a responsibility — to use and handle his ladder safely. When this dual responsibility is fully recognized, the code will have its maximum effect in promoting ladder safety.

Copies of American Standard Safety Code for Portable Wood Ladders, A14.1-1959, are available at $1.50.

How Tight Is Tight?

Reprinted from
Assembly and Fastener Engineering,
December, 1958

How to specify assembly torque may be the answer to many of industry's production problems. This article tells how the torsional strengths and other data specified in American Standard B18.6.4-1958 may help.

by W. M. HANNEMAN

WHAT ASSEMBLY TORQUE SHOULD BE SPECIFIED for a machine screw in a given application? Was the cause of a broken screw in an assembly the result of a wrong torque setting on the driver, the wrong screw having been specified, or was it just a low quality screw? What is the proper hole size and which type of tapping screw is best for specific application?

These questions, and others related to them often plague design and production engineers in industry today. It is unfortunate that many working engineers do not have torque and tensile data for small screws. These data and suitable means for verifying the screw properties often can be very helpful when trouble arises.

When torsional and tensile strengths of screw fasteners are known, it is often possible that smaller screws can be specified with sufficient strengths for the application. Also, if space or weight limitations are a factor in design, heat treated screws of smaller size may be substituted for larger diameter soft screws — perhaps resulting in a manufacturing cost reduction.

While tension is the important function of a fastener in use, the applied torque to attain this tension is also of great importance, particularly to the man on the assembly line. Assembly instructions and practices often include definite torque limits for specific applications. To obtain the proper torque limits to avoid undertightened screws or screws over-tightened to failure, requires some type of torque-measuring equipment.

Low carbon steel screws vary considerably in torsional strength which depends primarily on the hardness of wire from which they are made. The ability to measure the torsional strength of screws can be considered a quality control function. Minimum torsional strengths of tapping screws are now set forth in the newly issued American Standard B18.6.4-1958 from which the table, top of page 145, has been extracted.

With a torque-testing fixture such as the type made by P. A. Sturtevant Company the ultimate torsional strength of a screw can be determined. The screw is held in a split collet having thread impressions of the same diameter and pitch. The screw is prohibited from threading through by a bottoming wall in the collet. The collet is securely clamped in the fixture locating it directly below the spindle. A suitable driving bit is attached to the lower end of the spindle and a torque wrench engages with the upper end. The spindle is held in a threaded sleeve by frictionless bearings and the bit can be engaged or disengaged from the screw by means of the spindle adjusting wheel attached to this sleeve. The height of the spindle from the table can be varied by raising or lowering the spindle arm on the post which can also be raised or lowered for further height adjustment.

The use of tapping screws is constantly expanding. Engineers appreciate the cost savings and quality improvements derived from their use. Tapping operations are eliminated. Because of the greater strength of the screw, it can be driven much tighter than an ordinary machine screw and results in a more secure fastening. Since the screw produces its mating threaded hole, loose fits and wobble of the screw in the hole are practically eliminated. This type of screw is being successfully applied in steel, aluminum (rolled, extruded, cast, or die-formed), cast iron, die castings, plastics of most types, resin-impregnated plywood, asbestos, glass, fibers, etc.

Each application—because of environmental conditions such as hardness and kind of material, length of thread engagement, diameter and pitch, as well as type of tapping screw—requires an investigation to determine the proper hole size in the work piece.

In determining the proper hole size for a specific application of a tapping screw, a sample of the material into which the screw is to enter, and sample screws, must be obtained. Using the hole size tables set forth in the Appendix of American Standard B18.6.4-1958 as a basis, holes as given, also next drill sizes smaller and larger, are drilled into the test piece. If the test piece is in the form of a strip, a square anvil can be used by clamping it into the fixture. This will prohibit the strip from turning with the screw as torque is applied. Test pieces can also be held in a small vise, or, if irregular in shape, may even be clamped to the base of the fixture. Tee slots are provided in the fixture for this purpose.

Using a washer to represent the part to be held on by the screw, the screw is driven into the drilled hole

MR HANNEMAN, executive engineer, Shakeproof Division, Illinois Tool Works, is a member of the Company Member Conference of ASA, and a member-at-large of Sectional Committees B1, Standardization and Unification of Screw Threads and B27, Washers and Machine Rings.

with readings taken of the maximum torque required. Setting the screw down tight on the washer, torque is applied until a failure occurs. A failure may be either the thread in the work piece strips or the screw breaks. The torque required to cause failure is also read. Having three different diameters of holes, different values of driving and failure torques will be determined from which the best hole size can be selected. The driving torque required should be of a reasonable value in relation to the size of the screw. The corresponding failure torque should be at least three times as great as the driving torque to take care of variations of torque applied on the assembly line. A study of the actual test results permits this selection to be made.

[Here the original article showed a typical setup for determining a proper hole size in a die casting of irregular shape. In this setup a cover and gasket are to be attached to a housing by means of tapping screws.

This is an example of how the Sturtevant torque testing fixture assists in the selection of type of tapping screw and the proper hole size. Screws under consideration were Types 1, 23, and 25, originated and manufactured by the Shakeproof Division. (See table below.)

The material was an aluminum die casting of the actual part to which was to be attached a cover plate 1/8-inch thick. The screws selected were cadmium-plated No. 8 size, 7/16 long, giving 5/16 thread penetration into the casting. Each value given in the table is an average of five tests.]

Normally, soft No. 8 machine screws are driven at 18-20 pound-inches torque. This information is of value in analyzing the accumulated data. Considering the Type 1 Screw, the No. 26 drill hole is too small because of the relatively high driving torque and four failures due to screw breaking. The No. 25 drill hole is a better selection because of the lower driving torque and type of failure. The ultimate driving torque is quite high, permitting considerable variation in application torques and still permitting a much tighter joint than is possible with a machine screw.

Considering the Type 23 Screw, the selection of the No. 25 drill hole gives a lower driving torque and a slight reduction of ultimate torque, although this value is still considerably above that required.

Minimum Torsional Strength—in.-lb.

Screw Size	Type of Thread: A	B*, BF[1], BT[5], BG[2]	C N.C.	C N.F.	D[3], F, G & T[4] N.C.	D[3], F, G & T[4] N.F.
2	3	3	5	6	5	6
3	8	8	8	9	8	9
4	11	12	12	14	12	14
5	17	17	17	19	17	19
6	20	22	21	25	21	25
7	28	28				
8	36	36	39	44	39	44
10	45	52	52	69	52	69
12	78	82	87	101	87	101
14	117					
1/4		133	132	168	132	168
16	142					
5/16		270	285	347	285	347
18	183					
3/8		550	525	664	525	664
20	234					
24	460					

*Otherwise designated as Type Z
[1]Otherwise designated as Type FZ
[2]Otherwise designated as Type H
[3]Otherwise designated as No. 1
[4]Otherwise designated as No. 23
[5]Otherwise designated as No. 25

Extracted from American Standard Slotted and Recessed Head Tapping Screws and Metallic Drive Screws, ASA B18.6.4-1958, with permission of the publisher, The American Society of Mechanical Engineers.

The data concerning the Type 25 Screw show considerable variation of hole size possible with relatively little effect on the torque values. By selecting the No. 27 drill hole, we attain a relatively low driving torque to produce the mating threads in the die casting. We also get a high ultimate failure torque for secure fastening with a minimum chance of failure through overdriving. Because of the extra strength in the screw over that of a machine screw, greater applied torque will result in a more secure fastening. The holes may be die-cast and the normal tapping operation, together with its inherent costs of taps, plug gages and inspection, are eliminated, thereby reducing the manufacturing costs.

The torque-testing fixture can also be adapted to checking the torsional holding strength of a small gear riveted to a shaft, as is usual in clock and instrument design. Torsional reactance of clock springs or other types of torsional springs may be measured with this unit.

Results of test conducted to show how torque testing aids in selection of correct tapping screw and hole size

Hole		Torque — lb-in								
		Type 1			Type 23			Type 25		
Drill	*Dia.*	*Drive*	*Ult.*	*Fail*	*Drive*	*Ult.*	*Fail*	*Drive*	*Ult.*	*Fail*
25	.1495	11.6	63	5S	9	59	5S	7.2	49	5S
26	.147	15.6	71	1S 4B	10.8	59	4S 1B	7.2	57	5S
27	.144							8.4	67	5S
28	.1405			*			*	13.2	70	1S 4B *

* "S" denotes threads stripped from hole; "B" denotes screw broke.

This is the twentieth installment in the current series of rulings as to whether ***unusual industrial injury cases*** *are to be counted as "work injuries" under the provisions of American Standard Method of Recording and Measuring Work-Injury Experience, Z16.1-1954. The numbers in parentheses refer to those paragraphs in the standard to which the cases most closely apply. These cases are issued periodically by the Z16 Committee on Interpretations.*

Case numbers in the current series start with 400. Cases 400-500 have been reprinted with an index prepared by the National Safety Council. To make it easy to locate all cases applying to any section of the standard, the index is arranged both numerically by paragraph number of the standard and numerically by case number. Each index reference includes a brief description of the case. Reprints are 75 cents per copy, available from ASA.

Sectional Committee Z16 is sponsored by the National Safety Council and the Accident Prevention Department of the Association of Casualty and Surety Companies.

? ? ? ? ? ? ? ARE THESE CASES WORK INJURIES ? ? ? ? ? ? ?

CASE 622 [1.2.3. (g)]

A company asked for an interpretation of paragraph 1.2.3 (g). The question concerned the wording which states that simple fractures to the fingers and toes are not classified as permanent partial disabilities. The company had had a large number of cases arise wherein an injury to the fingers and toes involved a simple fracture, and where competent medical authority later determined that there had been permanent impairment or restriction of function of the finger or toe. The company did not believe that because a simple fracture was involved, the finding of competent medical authority was thereby invalidated.

Decision: The committee decided that such injuries as referred to should be included in the work injury rates. The members believed that the phrase "simple fractures" to the fingers and toes should not be interpreted out of context. Its significance is established by the general statement in the first paragraph of this section which specifies that any injury resulting in "any permanent impairment of functions of the body" shall be recorded as a permanent partial disability. Item (g) is intended to be a clarifying statement, not an exception, and the first phrase should not be read as excluding from permanent partial classification all simple fractures of the fingers or toes regardless of the ultimate outcome of the injuries. They believed that this reasoning is clear from the final clause of item (g), which identifies simple fractures of the fingers and toes with "other fractures as do not result in permanent impairment or the restriction of normal function of the injured member." The committee, therefore, concluded that item (g) means that simple fractures of the fingers or toes do not in themselves constitute permanent partial disabilities in the absence of actual permanent restriction of function in the injured member, but, in accordance with the basic classification rule, the ultimate result of the injury determines the disability classification, and not the nature of the injury itself.

CASE 623 (5.4)

An employee had punched out for the day and was walking through the company property on her way to catch a bus. A co-worker came along and pulled her by the hand to hurry her along, and at this point she twisted her ankle. The employee was away from work the following day for x-rays, which showed, however, that there was no fracture.

Some years previous to this, the employee had worked on a farm, plowing fields in her bare feet in all seasons. The doctor who examined her after this injury believed the woman had inadequate pedal support, and, afflicted with unstable ankles, was prone to twisting them.

Investigation of the courtyard area was made, and no obstacles which would have caused the fall were found in the area. The company asked if this should be excluded because of paragraph 5.4.

Decision: The committee decided that this injury should be included in the work injury rates on the basis that this employee was injured while traveling from her place of work to the exit from plant property, and she was, therefore, in the course of employment. The members did not believe that the injury arose solely from her pre-existing weakness, but rather from being pulled by a co-worker.

CASE 624 (5.18)

An employee who had as his primary work the duties of an animal worker, caring for normal monkeys in a biological production unit, complained of a sore throat, general aches and pains, and had a fever of 101. He was advised to go home from work to see his family doctor. During the following week the employee saw his physician at least twice and was treated with antibiotics, at the end of which time he was admitted to the hospital for diagnosis of fever of undetermined origin. The following day he developed symptoms of a respiratory paralysis and was placed in an iron lung. He presented definite signs of encephalitis, probably viral, possibly due to Simian Type "B" Virus. Ultimately, the man died.

Gross autopsy findings were scant and were of little help diagnostically. An extensive and detailed study was made, including examination of the animals, and a complete search of the literature on such deaths, but these proved in vain. The company doctor recommended payment of compensation, but the company desired to know the thinking of the committee, since every possible diagnostic and laboratory measure had been used to determine cause of death, and from a scientific and medical point of view it had been impossible to make a definite and exact diagnosis.

Decision: The committee concluded that this fatality should be included in the work injury rates. From the facts available, it appeared that there was significant evidence to establish an inference that this employee's illness arose out of and in the course of his employment.

CASE 625 [1.5 (c)]

A creek in the city was rising due to rains. An inspector in the city health department saw a person struggling in the water in an effort to reach the bank of the stream. The city worker entered the stream in an effort to save the other man's life, and was drawn beneath the water and washed into a wire fence. He was taken to the hospital for x-rays and treatment.

Decision: The committee concluded that this should be included in the work injury rates. The members believed that, whereas jumping into the water in an effort to save a man was not a part of the worker's assignment, this activity did come under paragraph 1.5 (c) as an act which would

meet with the consent or the approval of the employer (the city).

Case 626 (5.14)

An employee was accidentally sprayed with liquid methyl ether. While he was running from the laboratory, the ether vapor exploded and ignited the ether on his clothing, resulting in first and second degree burns to his back, chest, face, arms, and hands.

The employee lost approximately 11 weeks from work, at which time he returned to his job, but then started his vacation. About a week later, the employee was re-admitted to the hospital for treatment of homologous serum jaundice, with hepatitis, which the physician reported was brought about by the numerous blood transfusions given following the initial injury.

The company wondered if the lost time could be excluded from the rates on the basis of paragraph 5.14.

Decision: The committee decided that this injury should be considered a temporary total disability and included in the work injury rates. The members recalled that paragraph 5.14 referred to medication used in the treatment of non-disabling injuries.

Case 627 [A1.6 (d)]

A supervisory employee drove a company car on business to a city approximately 63 miles away from his headquarters. The entire trip was over public highways. Upon completion of his business meeting at about 4 p.m., the employee left to return to his residence, which was in the same city as his company headquarters. On the way home he stopped at a hotel located on the route approximately halfway to his destination, and there he had dinner and remained until about 11:50 p.m. After driving less than 10 miles beyond the hotel, the employee apparently fell asleep, and his car left the road. As a result, he received severe head lacerations which required him to be hospitalized for one day prior to his returning to his home, after which he lost several days from work. The hotel he visited was not off the direct route of travel, and the practice of stopping at this or other similar establishments for dinner when returning from business engagements was not unusual.

Decision: The committee decided that this accident should be included in the work injury rates. Although the employee may have stayed longer at the hotel than was necessary to have dinner, the accident occurred while he was driving on a direct route from the business meeting to his home, and under these circumstances would be considered as having arisen out of and in the course of employment in accordance with paragraph A1.6(d).

Case 628 (5.2)

An employee was assisting other members of a crew of four in lifting sections of a demountable tool shack (weighing from 190-305 pounds) onto a truck, a maximum height of six feet. He did not notice any pain during this lifting or during the remainder of the shift—about two hours. The next morning (Saturday) his back was painful, and he consulated his family doctor who gave him treatment. The employee worked all day Monday, and, although he complained of soreness in his back, he did not report any injury. The following day he was in such pain that he went to the Veterans' Administration for advice, and to his family doctor again. On Wednesday he returned to work, and about a week later reported to the employer's medical center which referred him to an orthopedist whose diagnosis was "recent lumbosacral strain superimposed on old injury to the lumbosacral spine." The employee was treated and lost several days from work.

This employee had sustained an injury in military service in which four lumbar vertebrae were fractured, resulting in about two years disability. Since that time he had had recurrent pain and soreness in the back, but had lost very little time from work. The company believed that this history had some bearing on the lack of promptness in reporting the injury.

Decision: The committee decided that this should be included in the work injury rates on the basis that the case met the requirements of paragraph 5.2 (a), and the doctor related the employee's condition to a recent strain, thus satisfying 5.2 (b).

Case 629 (1.7)

A company requested an interpretation of "regularly established job." For instance, on the job a lineman fractures his toe. Because of the cast, he cannot climb poles, which is a major portion of his job, but he can perform other beneficial and necessary related work of a regularly established job which is not "made" to accommodate the injured but which must be done at regular intervals, although not on a definite schedule. The company asked whether an injured employee must be able to perform all the duties of a regularly established job, assuming that the job in question included a variety of duties, all of which were generally not performed by a workman each day; or must the injured employee be physically able to perform *all* the duties of the job in order to justify a classification of non-disabling for the injury.

Decision: The committee interpreted "regularly established job" as follows:

The word "job" may be used in either of two senses:

(a) Meaning the full combination of duties for which a person is hired. In this sense it is synonomous with the word "position."

(b) Meaning a single duty or activity which in itself could constitute the entire responsibility of a "position" or which could be only a part of the combination of duties constituting a "position."

The specific sense in which the word is used in the standard must be determined from the context. The key to the interpretation lies in the modifying words "regularly established" and in the provision "which has not been established especially to accommodate an injured employee, either for therapeutic reasons or to avoid counting the case as a temporary total disability."

The phrase "regularly established" means that the assigned duty or duties must be activities which are normally required to be performed by some employee in the establishment and for which a person would normally be hired on a continuing basis. The word "regularly" rules out any duty or combination of duties which do not constitute a recognized position which would customarily be filled by a particular individual. This meaning is substantiated by the rule that the job must not have been "established especially to accommodate an injured employee."

Case 630 (1.2.4)

An employee did not report to work on a given day. Upon reporting the next day, he informed his supervisor that he had a sore foot, and he related it to his work (a reasonable relationship). He did not see a doctor, but made his own diagnosis, resulting in drugstore medical treatment. The employer presumed from the standard that a lay person is not qualified to diagnose his own injury, but questioned whether disabling injuries, not supported by medical opinion, should be counted in the rates; in other words, was it necessary in all cases to have a medical opinion in order that they may be included in the work injury rates.

Decision: The committee concluded that this case should be included in the work injury rates on the basis of paragraph 1.2.4 which states that, if an employee is unable to work for a full day, the injury is classified as a temporary total disability, and paragraph 5.18 which states that if there is any doubt about the disability, classification shall be based on the decision of the doctor. The members believed that, if the absence of a physician's certification that an injury was disabling were sufficient grounds on which to exclude the case from the injury rates, this might result in the undesirable effect of placing a premium upon failure to obtain medical attention for cases which at the outset appear to be relatively minor.

NEW BOOKS

SAMPLING OPINIONS. *An analysis of survey procedures. By Frederick F. Stephan and Philip J. McCarthy. 1958. John Wiley & Sons, Inc, 440 Fourth Avenue, New York, N. Y. $12.00.* This is one of the "Wiley Publications in Statistics" edited by Walter A. Shewhart and S. S. Wilks. Its purpose is to make it possible to use sampling techniques more intelligently. The book is based on studies started some years ago under the auspices of the Joint Committee on the Measurement of Opinion, Attitudes, and Consumer Wants appointed by the National Research Council and the Social Science Research Council. The committee members included mathematicians, statisticians, social scientists, engineers, and leading practitioners of opinion research. Among them were the late Dr P. G. Agnew, for many years secretary of the American Standards Association, and Vice Admiral G. F. Hussey, Jr, USN (Ret), now managing director of ASA. The late C. L. Warwick, for many years executive secretary of the American Society for Testing Materials, was also a member. Also among the members were the well-known authorities on statistical quality control W. Edwards Deming and Walter A. Shewhart, as well as public opinion experts George H. Gallup and Elmo Roper.

HEATING VENTILATING AIR CONDITIONING GUIDE 1959. *37th edition. 476 pp. 8½x11. Cloth bound. American Society of Heating Refrigerating and Air-Conditioning Engineers, 62 Worth Street, New York 13, N. Y.* $12.00. This new edition of the Guide contains larger illustrations, working charts, and tables, including 286 new or revised diagrams and charts, than previous editions.

Chapters have been expanded to include new outdoor winter design temperatures based on probability of occurrence of various temperatures; new steam pipe sizing charts and tables based on Moody friction data for steam flow; a revised table on gages and construction of air ducts including low-, medium-, and high-pressure ducts; revised information and illustrations for unit ventilators and their application; and a rewritten chapter on automatic control with new illustrations of control application. Also included are revisions of the information on sorbents; data on heat transfer coefficients for ventilated attics; revised information on sound absorption in ducts and plenums, noise levels, and diffuser noise; up-to-date values for maximum allowable concentration of contaminants in occupied spaces; a new section on the absorption refrigeration system; a new section on gas-fired year-round residential air conditioners; new data on duct construction for residences; a revised discussion of fuel utilization, efficiency, and consumption.

ASSOCIATION MANAGEMENT. *Edited by Kenneth G. Hance, Ph.D. 1958. 408 pp. Chamber of Commerce of the United States, Washington, D.C. $6.00.* Prepared by many association executives from various fields, this publication presents a reference for daily use in the management of an association. The 24 chapters of this book deal with the functions, activities, philosophy, techniques, and methods of associations, including the financial, promotional, and managerial aspects of such organizations.

T. E. Veltfort, chairman of ASA's Standards Council, contributed a chapter on technical research and standardization, applicable to the work of an association, including a thoroughgoing discussion of the development, promotion, and establishment of standards.

ASTM STANDARDS ON LIGHT METALS AND ALLOYS. *1958. 344 pp. American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa. $4.00.* This new edition includes the new color coding system for aluminum-base ingots, now part of the specification for aluminum-base alloys in ingot form for sand castings, die castings, and permanent mold castings. Revisions have been made in 25 of the standards covering cast and wrought aluminum and magnesium and their alloys as well as those for aluminum wire and cable, and light metal die casting alloys.

new international recommendations

ISO Recommendations published by the International Organization for Standardization, and IEC Publications issued by the International Electrotechnical Commission, Geneva, Switzerland. Copies are available from ASA.

FUNDAMENTAL QUANTITIES AND UNITS OF THE MKSA SYSTEM AND QUANTITIES AND UNITS OF SPACE AND TIME. *ISO R 31/Part I.* 1956. *First edition.* $1.80. Working with the number of international organizations, ISO Technical Committee 12 is preparing a comprehensive set of ISO recommendations dealing with quantities, units, conversion factors, and conversion tables, essential to proper understanding between scientists and engineers throughout the world. The United States is one of twenty countries actively participating in the work of Technical Committee 12. The American Standards Association, the U.S. member, acts on the advice of a Review Committee set up by Sectional Committee Y10, Letter Symbols.

Working with ISO/TC 12 on this program are the Comité International des Poids et Mesures, the International Electrotechnical Commission, International Union of Pure and Applied Physics, International Union of Pure and Applied Chemistry, and Comité International Provisoire de Metrologie Legale.

Part I outlines general principles and gives a table of fundamental quantities and units of the meter-kilogram-second-ampere system, with their symbols and definitions, and a table of the quantities and units of space and time. This latter table includes conversion factors and explanatory remarks in addition to the symbol and definition.

Other fields for which the committee plans to define quantities and units include periodic and related phenomena (see Part II below), mechanics, heat, electricity and magnetism, light, sound, chemistry and atomic physics, and possibly others.

QUANTITIES AND UNITS OF PERIODIC AND RELATED PHONOMENA. *ISO R 31/ Part II.* 1958. *First edition.* $1.20. This is the second part of the comprehensive series of publications to define quantities and units in many technical and scientific fields on which ISO Technical Committee 12 is working. It gives the international symbol for each quantity, its definition, the name of the unit, and the international symbolic abbreviation for the unit.

RECOMMENDATIONS FOR ALUMINIUM ELECTROLYTE CAPACITORS FOR GENERAL PURPOSE APPLICATION. *IEC Publication 103.* 1959. *First edition.* $3.20. This publication applies to polarized electrolytic capacitors with aluminum electrodes, intended for general-purpose application in telecommunication equipment and in electronic devices employing similar techniques, at ambient temperatures above -25 C. Requirements for judging the mechanical, electrical, and climatic properties of these capacitors are given.

The publication describes test methods and gives recommendations for classification into groups, in accordance with ability to withstand conditions as specified in IEC Publication No. 68, Basic Climatic and Mechanical Robustness Testing Procedure for Components for Radio-Communication. It is intended that Publication 103 should be used in conjunction with IEC Publication No. 68.

STANDARDS FROM OTHER COUNTRIES

Members of the American Standards Association may borrow from the ASA Library copies of any of the following standards recently received from other countries. Orders may also be sent to the country of origin through the ASA office. Titles are given here in English, but documents are in the language of the country from which they were received. An asterisk * indicates that the standard is available in English as well. For the convenience of readers, the standards are listed under their general UDC classifications. In ordering copies of standards, please refer to the number following the title.

621.791 WELDING AND ALLIED TECHNIQUES

Australia (SAA)

Glossary of welding terms and definitions A.S.No.Z.5-1958

Germany (DNA)

Rules for preparing weld joints for gas welding steel. Symbols DIN 8551
2 stds for gas welding wires for seam welding of steels DIN 8554

India (ISI)

Glossary of terms relating to welding and cutting of metals IS:812
Filler rods and wires for gas welding IS:1278

United Kingdom (BSI)

Rating of resistance welding equipment BS 3065:1959
Dimensions of blanks for seam welding wheels BS 3067:1959

621.86/.87 MECHANICAL HANDLING AND HOISTING EQUIPMENT

Austria (ONA)

Hoisting signs ONORM M 9604

France (AFNOR)

Methods of mechanical tests of pallets PN H 50-003

Japan (JISC)

Wooden pallets JIS D 6002

Spain (IRATRA)

Rubberized fabric conveyor belts, testing UNE 18055

Sweden (SIS)

Hoisting chains. General regulations and instructions SMS 1546
2 stds for different types of shackles SMS 1577, -1619
Shackles, bolts SMS 1664
Flat four-way entry pallet SIS 71 00 01

625.2 RAILWAY ROLLING STOCK

France (AFNOR)

Cast, stamped or engraved letter symbols on the engine NF F 00-004
Standardized perforated head screws for railroad cars NF F 00-006
3 stds for rules for manufacturing straight axle shafts, unfinished, semi-finished and finished NF F 01-009,-011,-013
Axle shafts center holes NF F 01-014
4 stds for marking of axle shafts, wheels, tyres and mounted shafts NF F 01-026/9
Dovetail clamps for tyres NF F 03-012
Bored tyres. Tolerances NF F 03-013
Method of mounting of 135 mm tyres with dovetail clamps NF F 03-401
Sheating strips and boards for railway carriages and waggons of normal track NF F 33-401

Hungary (MSZH)

Brake shoes for railway vehicles MSZ 2750-58
Coupling assembly for railway cars MSZ 2758-58
Wheel, pressed mono-block type for railway cars MSZ 5592-57
Screw-link coupling, 65 tons capacity for railway cars MSZ 12034-56

Italy (UNI)

Railway car water tanks UNI 3168
Brakes for railway rolling stock. Terminology and definition UNI 4098
3 stds for frame railway platform for transporting non-pressure liquids UNI 4112/4

Poland

3 stds for car wheels PN K-91039/41
Brake shoes PN K-91247

Spain (IRATRA)

2 stds for finished and unfinished wheel rims for railway cars of normal width UNE 25019,-23

629.113 MOTOR CARS. AUTOMOBILE ENGINEERING

Austria (ONA)

Automobile manufacturing, general definitions, carrying capacity ONORM V 5003

Czechoslovakia (CSN)

Automobile tire valves CSN 30 3868

Germany (DNA)

Motor vehicles, trailers, trains, terminology DIN 70010

Hungary (MSZH)

Automobile steering wheel: main dimensions MSZ 293-57

Japan (JISC)

Tire chains for automobiles JIS D 4241
Automobile disc wheels JIS D 7302
Steering tie rod joint JIS D 7304
Clutch release bearing JIS D 7308
Water pump for automobile JIS D 7311
4 stds for distributor cap and accessories JIS D 7316/9

USSR

Brake shoe linings for passenger automobiles GOST 8873-58

666 GLASS AND CERAMIC INDUSTRY

Israel (SII)

Glass threads S.I. 274
2 stds for milk bottles: nominal capacity 200 and 500 ml S.I. 275/6
Pharmaceutical glass bottles S.I. 277

Japan (JISC)

2 stds for glassware for chemical analysis JIS R 3502/3
2 stds for coverglass and sideglass for microscope JIS R 3702/3

Sweden (SIS)

Wired glass SIS 52 55 10
2 stds for screw caps types A and B SIS 71 10 13/4

United Kingdom (BSI)

Preferred sizes of fireclay refractories BS 3056:1959

669.1 FERROUS METALS

Austria (ONA)

Chain steel ONORM M 3118

France (AFNOR)

Quality indicator. Radiographic examination of steel or cast iron parts up to 180 mm thick NF A 04-304
Round drawn hard steel wires for springs NF A 47-301

Germany (DNA)

Strip steel, hot rolled DIN 1016

Hungary (MSZH)

Steel rods, round, rolled, standard sizes MSZ 4337-57
Tool steel, technical requirements MSZ 4350-56
Steel rods, round, ground and polished, diameter from 2 to 110 mm MSZ 4379-58
Steel wire, half-round, for split cutter pins MSZ 5847-58

India (ISI)

Structural steel IS:226

Israel (SII)

Twisted steel bars for concrete reinforcement S.I. 186

Italy (UNI)

Steel rods, hot drawn for riveting UNI 4005
Special casting steel with high mechanical characteristics UNI 4010
2 stds for rough forged steel block blanks for further machining UNI 4049/50

Japan (JISC)

General rules for chemical analysis of iron and steel JIS G 1201
15 stds for different chemical analyses of iron and steel JIS G 1211/7,-1220/5,-1229,-1231

USSR

Carbon steel castings, technical requirements GOST 977-58
Rolled steel, uneven angle sections GOST 8510-57

678 MACROMOLECULAR MATERIALS

United Kingdom (BSI)

Methods of testing vulcanized rubber: Method for the determination of rubber-to-fabric adhesion (ply separation) BS 903:Part A 12:1958
Methods of testing vulcanized rubber: Determination of total copper BS 903:Part B 17:1959
Methods of testing vulcanized rubber: Preparation and examination of water extract BS 903:Part B 19:1958
Methods of testing plastics: Miscellaneous methods BS 2782:Part 5:1958

news briefs.....

• AS WARM SUN AND CLEAR SKIES encourage gardeners to start digging and planting, it is appropriate that the new edition of the American Standard for Nursery Stock has just come off the presses. Sponsored by the American Association of Nurserymen, the standard offers a guide to sizes, relative dimensions, and similar requirements for different grades and types of trees, shrubs, vines, and other nursery plants. For the guidance of both nurseryman and gardener, a standard shade tree with trunk caliber of 1 to 1¼ in., for example, should have a height range of 7 to 9 ft, with a minimum root spread of 18 in. A small upright tree of 9/16 in. caliber, and from 4 to 5 ft high, should have five or more branches. A medium grade floribunda rose has two or more strong canes 14 in. and up, whereas a Grade No. 1 has three or more strong canes, two of which measure 15 in. This, of course, is only a sample of the wealth of information contained in this American Standard. Here, a gardener has an opportunity to refer to sections devoted specifically to deciduous trees, deciduous shrubs, evergreens, Christmas trees, roses, vines, fruit trees, small fruits, asparagus crowns, lining out stock, trees for forest planting, bulbs, corms, and tubers, and recommended balling and burlapping specifications. Charts illustrate the specifications and show comparisons between various types of deciduous shrubs, evergreens, and different grades of roses.

The 1959 edition is the result of a most thorough revision to bring the standard into conformity to accepted general practices of the day, reports Richard P. White, executive vice-president of the American Association of Nurserymen.

Initiated by a committee of the Landscape Materials Information Service, an organization of landscape nurserymen, landscape contractors, landscape architects, housing and park authorities, and roadside engineers, the revision finally involved 18 organizations and many individuals.

Never has the American Standard for Nursery Stock been subjected to such a critical examination by so many, Mr White points out. Now, in practically all details the standard is acceptable to all. In only a very few instances is there disagreement, he explains. This is due to the desire on the part of some consumers to increase the minimum requirements for root spread of shade trees. These increases were not fully acceptable to the producers and therefore acceptance was obtained on the 1959 revision with the understanding that the consumer may issue offers for bids for plant material which will carry specifications at variance to the American Standard to meet special or unusual requirements or situations.

No revisions have been made in the sections on fruit trees, bulbs and corms, or root crops handled by nurserymen, such as asparagus. The sections on shade trees, coniferous and broad-leaved evergreens, roses, deciduous shrubs, and on balling and burlapping have undergone numerous modifications, all of which were made to sharpen the standards and to make them more definitive.

The American Standard for Nursery Stock, Z60.1-1959, has been published by the American Association of Nurserymen. Copies can be obtained from the American Standards Association at 50 cents each.

• MANY STANDARDS MEN will remember Fred H. Colvin, retired editor of *American Machinist*. Mr Colvin was 91 in October, 1958. He is still interested in standards, and made a point of attending the Ninth National Conference on Standards in New York in November, 1958. His comments on standardization are worth noting.

"Few realize," he said, "the efforts the first committee on screw threads had to exert to get men interested, in spite of the fact that you could not be sure that nuts made in New York would fit Philadelphia-made bolts. When one of the large makers deliberately made its 1/4-inch bolts 1/32-inch larger, it forgot to say they were oversize! It took 30 years and two world wars to get the ABC standards. How much time and effort was wasted in the meantime!"

Mr Colvin is shown in the accompanying picture talking with Forest H. Bump, Grinding Machine Division, Norton Company, and Arthur W. Colton, American Society of Tool Engineers, during the conference session on machine tools.

Raimondo Borea

Fred H. Colvin (center), Forest H. Bump (left), and Arthur W. Colton (right).

Dr Allen V. Astin, director of the National Bureau of Standards, displays the set of measurement standards presented by the Bureau to the State of Alaska.

Congressmen from Alaska and the U. S. Secretary of Commerce inspect the measurement standards presented to the new state: Left to right, Senator E. L. Bartlett, Secretary of Commerce Lewis L. Strauss, Representative Ralph J. Rivers, and Senator Ernest Gruening.

▪ STANDARDS OF THE FUNDAMENTAL UNITS involved in commercial exchange were presented to the new State of Alaska in a special program held at the National Bureau of Standards March 3. Weights and measures comprising standards of length, mass, and capacity were presented by Secretary of Commerce Lewis L. Strauss to the forty-ninth state, represented at the ceremony by Senators E. L. Bartlett and Ernest Gruening and Congressman Ralph J. Rivers.

By providing the new State of Alaska with accurate and reliable standards, a basis is established which allows it to relate its measurement activities to those of the other states. As Secretary Strauss stated in welcoming the state to the nation's measurement family, "The value for the pound, the yard, and the gallon will be the same whether you are transacting business in Maine or in California, in Florida or in Alaska."

The standards presented to Alaska have been calibrated by the Bureau in terms of the national standards of measurement, Prototype Meter Bar No. 27 and Prototype Kilogram No. 20. Included in the set were a combination yard-meter bar and a 100-ft steel measuring tape for length calibrations; standard weights from 50 pounds to 0.1 ounce; and capacity standards in denominations ranging from 5 gallons down to 2 fluid ounces. Each standard was accompanied by a certificate presented by the National Bureau of Standards giving its calibrated value.

In addition to the set of standards, the State of Alaska received a collection of documents pertaining to weights and measures administration. These included NBS handbooks on the technical aspects of weighing and measuring devices and a proposed weights and measures bill based on the model state law adopted by the National Conference on Weights and Measures. The new state was formally invited to use these documents and to participate in the activities of the Conference—the principal means of implementing cooperation among NBS, state and local weights and measures officials, and manufacturers and users of weighing and measuring equipment.

• A SERIES OF FORUMS is being planned by the American Society for Testing Materials to discuss standardization of requirements for engineering materials used in nuclear reactors. There is now a great deal of activity in this field throughout the approximately 80 ASTM technical committees, but there still remain some areas in which needed work is lacking. This was recognized at the February meeting of the ASTM Special Administrative Committee on Nuclear Problems as probably being due to the absence of people on committees who are familiar with the problems. The organization of the forums is a step to correct the situation.

The first forum of the series will be held at 2 p.m., Thursday, June 25, at Haddon Hall, Atlantic City, N. J., during the 62nd ASTM Annual Meeting. All ASTM committees are being invited to send representatives to these forums.

Whether or not they are ASTM members, people engaged in nuclear energy projects are urged to attend and participate in the discussion. It is hoped to exchange information on standardization work being done in the ASTM committees and to bring to light work which should be considered. These forums should be of prime concern to any person interested in having acceptable industry-wide purchase specifications established for materials used in the construction of reactors.

N. L. Mochel, consultant and manager, Metallurgical Engineering, Westinghouse Electric Corporation, a past president of the Society and chairman of the Administrative Committee on Nuclear Problems, will preside.

A second forum is being planned for the ASTM 3rd Pacific Area National Meeting to be held in San Francisco October 11-16, 1959.

• REPRESENTATIVES of the Technical Association of Pulp and Paper Industries and the American Society for Testing Materials have recommended that the United States participate in the work of ISO Technical Committee 6 on Paper. As a result, an advisory committee will be set up to formulate an American viewpoint and handle the administrative work. Any organization concerned with international paper standards is invited to become a member of this committee. ISO/TC 6 is circulating three drafts of standards recommendations: (1) trimmed sizes of paper for writing and printing; (2) sizes of envelopes; and (3) method of specifying grain direction of paper.

• HOW ARCHITECTURAL DESIGNERS can plan buildings to make it easier for handicapped people to make a living will be the subject of a new standards project, if a proposal just received by the American Standards Association is approved. Requested by the President's Committee on Employment of the Physically Handicapped, the project would carry forward work already started on a Guide to call attention to needless barriers that now often bar both employment and legitimate business opportunities to many handicapped citizens. The Veterans' Administration, under the President's Committee, has been primarily responsible for preparing this Guide, which is based on the experience of organizations and agencies concerned and in consultation with architects and engineers, authorities in colleges, and rehabilitation facilities.

A General Conference has been called to consider the proposal.

• THE UNITED STATES will participate through the American Standards Association in the work of the International Organization for Standardization Technical Committee 78, Aromatic Hydrocarbons. Committee D-16 of the American Society for Testing Materials will advise ASA on the U. S. viewpoint. The committee, which covers industrial aromatic hydrocarbons and related materials, has organized Subcommittee H with responsibility for the international work.

• "SCIENTIST, ENGINEER, AND FOREMOST LEADER in the field of standardization," was the description applied to Dr Lal C. Verman, director of the Indian Standards Institution, at the opening of the Institution's fourth Standards Convention in New Delhi recently. The description came from the Prime Minister of India, Mr Nehru, who conferred on Dr Verman the first "K. L. Moudgill Prize." Dr Moudgill, whose valuable services in the field of standardization to ISI the prize commemorates, was also honored by Mr Nehru.

The six-day convention had a record attendance of over 800, and more than 1000 delegates were present for the inaugural ceremonies. For the first time there were representatives from women's organizations who contributed to a session on consumer standards and certification. Other subjects discussed during the convention were metric conversion, export promotion, safety and health, steel economy, alloy and special steels, and modular planning.

• CYRIL AINSWORTH, deputy managing director of the American Standards Association, has been released from his duties at ASA for a period of four months to undertake a study of the specifications problems of the Department of Defense. By a vote of its board of directors, ASA was authorized to enter into a contract with the Department to provide the services of Mr Ainsworth for the study.

• FRANK PHILIPPBAR is now standards manager of the American Society of Mechanical Engineers, serving as secretary both to the ASME Standardization Committee and to the ASME Board on Codes and Standards. He has direct supervision over the dimensional standards and safety codes area and supervises other standards and codes insofar as the mechanics of submission to the Board on Codes and Standards is concerned.

• THE HISTORY OF METAL CUTTING was the title of the Third Annual Eli Whitney Memorial Lecture, presented by Swan E. Bergstrom at the 27th Annual Meeting of the American Society of Tool Engineers, April 18-22. Mr Bergstrom is president of Cincinnati Milling Machine Company and a member of the ASTE Research Fund Com-

mittee. In his lecture Mr Bergstrom sketched highlights of metal cutting from neolithic times to the present.

The Annual Eli Whitney Lecture was established by ASTE in 1957 to commemorate the name of the first American to introduce the use of standardized interchangeable parts to manufacture finished products on a mass-production basis.

• AT A RECENT CEREMONY in Bangkok, Thailand, a complete set of British Standards and Codes of Practice was presented on behalf of B.S.I. to the Director of Bangkok's Technical Institute. The presentation was made by the British Ambassador, Sir Richard Whittington.

In a letter of thanks to the Ambassador, the Director-General of Thailand's Department of Vocational Education said, "This set of standards and codes is the only one of its kind now available in Thailand and the fact that it has been placed within reach of Thailand's future technologists will prove to have lasting benefits."

—From *BSI News*, March 1959

• NEARLY 30 OF B.S.I.'S PUBLICATIONS have been chosen by the British Council for inclusion in a display which is to tour Sweden this spring. The exhibition, of advanced-level British scientific and technical books, will be held in four universities — Stockholm, Lund, Gothenburg, and Uppsala.

Among the British Standards on display will be several concerned with agricultural machinery, mining and chemical apparatus, the Code of Practice for site investigations, and the standard covering plywood for marine craft.

By way of a printed catalog, these British Standards will come to the notice of an even wider audience than those able to visit the display at the universities.

—From *BSI News*, March 1959

• A RECENT ARTICLE in the journal of the Russian Central Institute of Furniture Research revealed that performance tests used in Russia to assess the durability of furniture are based on those contained in British Standard 1960 *Domestic furniture*. The article acknowledged the work done in this field by the Furniture Development Council.

—From *BSI News*, March 1959

AMERICAN STANDARDS

Just Published

If your company is a member of the American Standards Association, you are entitled to receive membership service copies of these newly published American Standards. Find out who your ASA contact is in your company. Order your American Standards through him. He will make sure your company receives the membership service to which it is entitled.

DRAWINGS, SYMBOLS, AND ABBREVIATIONS

American Standard Drafting Manual, Section 10, Metal Stampings, Y14.10-1959 (Partial revision of Z14.1-1946) $1.50

Indicates the basic empirical layout and drafting practices specifically related to metal stampings.

Sponsors: American Society of Mechanical Engineers; American Society for Engineering Education

ELECTRIC AND ELECTRONIC

Armored Cable, Safety Standards for, C33.9-1959 (7th ed. of UL 4) $0.75

Sponsor: Underwriters' Laboratories

Definitions of Electrical Terms Group 15, Transformers, Regulators, Reactors, and Rectifiers, C42.15-1958 $1.00

Sponsor: American Institute of Electrical Engineers

MISCELLANEOUS

Nursery Stock, Z60.1-1959 (Revision of Z60.1-1952 and addendum Z60.1a-1955) $0.50

Sponsor: American Association of Nurserymen, Inc

PETROLEUM PRODUCTS AND LUBRICANTS

Carbon Residue of Petroleum Products, Method of Test for, ASTM D 189-58; ASA Z11.25-1958 (Revision of ASTM D 189-52; ASA Z11.25-1952) $0.30

Knock Characteristics of Motor Fuels by the Research Method, Method of Test for, ASTM D 908-58; ASA Z11.69-1958 (Revision of ASTM D 908-56; ASA Z11.69-1956) $0.30

Existent Gum in Fuels by Jet Evaporation, ASTM D 381-58T; ASA Z11.36-1958 (Revision of ASTM D 381-52T; ASA Z11.36-1953) $0.30

Knock Characteristics of Motor Fuels by Motor Method, ASTM D 357-58; ASA Z11.37-1958 (Revision of ASTM D 357-56; ASA Z11.37-1956) $0.30

Apparent Viscosity of Lubricating Greases, ASTM D 1092-58T; ASA Z11.72-1958 (Revision of ASTM D 1092-55; ASA Z11.72-1955) $0.30

Polarographic Determination of Tetraethyllead in Gasoline, Test for, ASTM D 1269-58; ASA Z11.98-1958 $0.30

Sponsor: American Society for Testing Materials

PHOTOGRAPHY

Photographic Flash Lamps, Method for Testing, PH2.13-1958 (Revision of Z52.43-1944) $0.35

Describes the apparatus, its calibration and procedure for testing photographic flash lamps.

Special-Purpose Photographic Exposure Indexes for Short and Long Exposure Times, Method for Determining, PH2.14-1958 $0.80

Sponsor: Photographic Standards Board

Front Lens Mounts for Cameras, Dimensions of, PH3.14-1958 (Revision of PH3.14-1944) $0.35

Sponsor: Photographic Standards Board

PIPE AND FITTINGS

Welded and Seamless Steel Pipe, Tentative Specifications for, ASTM A 53-58T; ASME SA-53; ASAB36.1-1959 (Revision of ASTM A 53-55T; ASME SA-53; ASA B36.1-1956) $0.30

Sponsors: American Society for Testing Materials; American Society of Mechanical Engineers

PLASTICS

Molds for Test Specimens of Plastic Molding Materials, Specifications for, ASTM D 647-57; ASA K66.1-1959 $0.30

Apparent Density and Bulk Factor of Granular Thermoplastic Molding Powder, Method of Test for, ASTM D 1182-54; ASA K66.2-1959 $0.30

Shrinkage from Mold Dimensions of Molded Plastics, Methods of Measuring, ASTM D 955-51; ASA K66.3-1959 $0.30

Sponsor: American Society for Testing Materials

Ethyl Cellulose Molding Compounds, Specifications for, ASTM D 787-55; ASA K64.1-1959 $0.30

Cellulose Acetate Plastic Sheets, Specifications for, ASTM D 786-49; ASA K64.2-1959 $0.30

Cellulose Nitrate (Pyroxylin) Plastic Sheets, Rods, and Tubes, Specifications for, ASTM D 701-49; ASA K64.3-1959 $0.30

Sponsor: American Society for Testing Materials

Compressive Properties of Rigid Plastics, Method of Test for, ASTM D 695-54; ASA K65.1-1959 $0.30

Stiffness Properties of Nonrigid Plastics as a Function of Temperature by Means of a Torsional Test, Method of Test for, ASTM D 1043-51; ASA K65.2-1959 $0.30

Rockwell Hardness of Plastics and Electrical Insulating Materials, Method of Test for, ASTM D 785-51; ASA K65.3-1959 $0.30

Deformation of Plastics Under Load, Methods of Test for, ASTM D 621-51; ASA K65.4-1959 $0.30

Haze and Luminous Transmittance of Transparent Plastics, Method of Test for, ASTM D 1003-52; ASA K65.5-1959 $0.30

Luminous Reflectance, Transmittance, and Color of Materials, Method of Test for, ASTM D 791-54; ASA K65.6-1959 $0.30

Index of Refraction of Transparent Organic Plastics, Methods of Test for, ASTM D 542-50; ASA K65.7-1959 $0.30

Specific Gravity of Plastics, Method of Test for, ASTM D 792-50; ASA K65.8-1959 $0.30

Total Chlorine in Vinyl Chloride Polymers and Copolymers, Method of Test for, ASTM D 1303-55; ASA K65.9-1959 $0.30

Ammonia in Phenol-Formaldehyde Molded Materials, Method of Test for, ASTM D 834-57; ASA K65.11-1959 $0.30

Acetone Extraction of Phenolic Molded or Laminated Products, Method of Test for, ASTM D 494-46; ASA K65.12-1959 $0.30

Sponsor: American Society for Testing Materials

SAFETY

Safety Code for Portable Wood Ladders, A14.1-1959 (Revision of A14.1-1952) $1.50

Material and construction requirements for step ladders, rung ladders, and special-purpose ladders, including a section on care and use of ladders.

Sponsors: American Ladder Institute; American Society of Safety Engineers; National Association of Mutual Casualty Companies

WOOD AND WOOD PRESERVATIVES

Creosoted End-Grain Wood Block Flooring for Interior Use, Specifications for, ASTM D 1031-55; ASA O10.1-1958 $0.30

Modified Wood, Specifications for, ASTM D 1324-57T; ASA O12.1-1958 $0.30

Sponsor: American Society for Testing Materials

AMERICAN STANDARDS UNDER WAY

Status as of April 20, 1959

ACOUSTICS, VIBRATION, AND MECHANICAL SHOCK

American Standard Approved

Magnetic Recording Instruments for the Home—Wire Size, Speed, Spools, Z57.4-1959

Sponsor: Institute of Radio Engineers

AUTOMOTIVE

In Standards Board

Specific Gravity of Concentrated Engine Antifreezes by the Hydrometer, Method of Test for, ASTM D 1122-58; ASA D14.3- (Revision of ASTM D 1122-53; ASA D14.3-1955)

Sponsor: American Society for Testing Materials

BUILDING AND CONSTRUCTION

In Standards Board

Gypsum Plasters, Specifications for, ASTM C 28-58; ASA A49.3- (Revision of ASTM C 28-57; ASA A49.3-1958)

Sponsor: American Society for Testing Materials

Billet-Steel Bars for Concrete Reinforcement, Specifications for, ASTM A 15-58T; ASA A50.1- (Revision of ASTM A 15-57T; ASA A50.1-1958)

Cold-Drawn Steel Wire for Concrete Reinforcement, Specifications for, ASTM A 82-58; ASA A50.3 (Revision of ASTM A 82-34; ASA A50.3-1936)

Sponsor: American Society for Testing Materials

Gypsum Wallboard, Specifications for, ASTM C 36-58; ASA A69.1- (Revision of ASTM C 36-55; ASA A69.1-1956)

Sponsor: American Society for Testing Materials

Ignition Loss and Active Calcium Oxide in Magnesium Oxide for Use in Magnesium Oxychloride Cements, Method of Test for, ASTM C 247-57; ASA A88.16- (Revision of ASTM C 247-52; ASA A88.16-1953)

Sponsor: American Society for Testing Materials; National Bureau of Standards

Building Brick (Solid Masonry Units Made from Clay or Shale), Specification for, ASTM C 62-58; ASA A98.1- (Revision of ASTM C 62-57; ASA A98.1-1958)

Sponsor: American Society for Testing Materials

Sewer Brick (Made from Clay or Shale), Specification for, ASTM C 32-58; ASA A100.1- (Revision of ASTM C 32-50; ASA A100.1-1954)

Sponsor: American Society for Testing Materials

Fireclay and High-Alumina Refractory Brick, Classification of, ASTM C 27-58T; ASA A111.5- (Revision of ASTM C 27-41; ASA A111.5-1956)

Basic Procedure in Panel Spalling Test for Refractory Brick, Method for, ASTM C 38-58; ASA A111.6- (Revision of ASTM C 38-52; ASA A111.6-1955)

Sponsor: American Society for Testing Materials

Structural Rivet Steel, Specifications for, ASTM A 141-58; ASA G21.1- (Revision of ASTM A 141-55; ASA G21.1-1956)

Sponsor: American Society for Testing Materials

Steel for Bridges and Buildings, Specifications for, ASTM A 7-58T; ASA G24.1- (Revision of ASTM A 7-56T; ASA G24.1-1957)

Sponsor: American Society for Testing Materials

Welded Steel Wire Fabric for Concrete Reinforcement, Specifications for, ASTM A 185-58T; ASA G45.1- (Revision of ASTM A 185-56T; ASA G45.1-1957)

Sponsor: American Society for Testing Materials

High-Strength Steel Castings for Structural Purposes, Specifications for, ASTM A 148-58; ASA G52.1- (Revision of ASTM A 148-57; ASA G52.1-1958)

Sponsor: American Society for Testing Materials

Areas in Hospitals and Related Facilities, Method of Determining, Z65.4-

Sponsors: National Association of Building Owners and Managers; Office of Education, Dept of Health, Education and Welfare

CHEMICAL

American Standards Approved

Raw Linseed Oil, Specifications for, ASTM D 234-58; ASA K34.1-1959 (Revision of ASTM D 234-55; ASA K34.1-1956)

Sponsor: American Society for Testing Materials

Boiled Linseed Oil, Specifications for, ASTM D 260-58; ASA K35.1-1959 (Revision of ASTM D 260-55; ASA K35.1-1956)

Sponsor: American Society for Testing Materials

In Standards Board

Turpentine, Methods of Sampling and Testing, ASTM D 233-58; ASA K33.1- (Revision of ASTM D 233-36; ASA K33-1937)

Sponsor: American Society for Testing Materials

CONSUMER GOODS

In Standards Board

Alkaline Detergents, Methods of Sampling and Chemical Analysis of, ASTM D 501-58; ASA K60.21- (Revision of ASTM D 501-57; ASA K60.21-1958)

Sponsor: American Society for Testing Materials

DRAWINGS, SYMBOLS, AND ABBREVIATIONS

In Board of Review

Illustrations for Publication and Projection, Y15.1- [Revision of Z15.1-1932 (R1947) and Z15.3-1943 (R 1947)]

Sponsor: American Society of Mechanical Engineers

In Standards Board

Letter Symbols for Feedback Control Systems, Y10.13-

Sponsor: American Society of Mechanical Engineers

Reaffirmation Approved

Letter Symbols for Acoustics, Y10.11-1953 (R 1959)

Sponsor: American Society of Mechanical Engineers

ELECTRIC AND ELECTRONIC

American Standards Approved

Television Luminance Signal Levels, Method of Measurement of, C16.31-1959

Sponsor: Institute of Radio Engineers

Dry Cells and Batteries, Specifications for, C18.1-1959 (Revision of C18.1-1954)

Sponsor: National Bureau of Standards

Schedules of Preferred Ratings for Power Circuit Breakers, C37.6-1959 (Revision of C37.6-1957)

Sponsor: Electrical Standards Board

In Board of Review

Relays, Definitions and Terminology for, C83.16-

Sponsor: Electronic Industries Association

In Standards Board

Soft Rectangular and Square Bare Copper Wire for Electrical Conductors, Specifications for, ASTM B 48-58; ASA C7.9- (Revision of ASTM B 48-57; ASA C7.9-1958)

Rope-Lay-Stranded Copper Conductors Having Bunch-Stranded Members for Electrical Conductors, Specifications for, ASTM B 172-58; ASA C7.12- (Revision of ASTM B 172-55; ASA C7.12-1953)

Rope-Lay-Stranded Copper Conductors Having Concentric-Lay-Stranded Members for Electrical Conductors, Specifications for, ASTM B 173-58; ASA C7.13- (Revision of ASTM B 173-55; ASA C7.13-1953)

Bunch-Stranded Copper Conductors for Electrical Conductors, Specifications for, ASTM B 174-58; ASA C7.14- (Revision of ASTM B 174-53T; ASA C7.14-1953)

Concentric-Lay-Stranded Aluminum Conductors, Hard-Drawn Three-Quarters Hard-Drawn and Half-Hard-Drawn, Specifications for, ASTM B 231-58; ASA C7.21- (Revision of ASTM B 231-57; ASA C7.21-1958)

Concentric-Lay-Stranded Aluminum Conductors, Steel-Reinforced (ACSR), Tentative Specifications for, ASTM B 232-58; ASA C7.22- (Revision of ASTM B 232-57T; ASA C7.22-1958)

Resistivity of Electrical Conductor Materials, Method of Test for, ASTM B 193-58; ASA C7.24- (Revision of ASTM B 193-57; ASA C7.24-1958)

Copper Bus Bar, Rod and Shapes, Specifications for, ASTM B 187-58; ASA C7.25- (Revision of ASTM B 187-55; ASA C7.25-1957)

Seamless Copper Bus Pipe and Tube, Specifications for, ASTM B 188-58; ASA C7.26- (Revision of ASTM B 188-56; ASA C7.26-1957)

Standard Weight Zinc-Coated (Galvanized) Steel Core Wire for Aluminum Conductors, Steel Reinforced (ACSR), Specifications for, ASTM B 245-58; ASA C7.28- (Revision of ASTM B 245-55; ASA C7.28-1956)

Zinc-Coated (Galvanized) Steel Core Wire (With Coatings Heavier Than Standard Weight) for Aluminum Conductors, Steel Reinforced (ACSR), Specifications for, ASTM B 261-58; ASA C7.34- (Revision of ASTM B 261-55; ASA C7.34-1956)

Sponsor: American Society for Testing Materials

Electrical Indicating Instruments, C39.1- (Revision of C39.1-1955)

Sponsor: Electrical Standards Board

Measurement of Direct Interelectrode Capacitance, C60.6- (Revision of C60.6-1952)

Sponsor: Joint Electron Device Engineering Council

MECHANICAL

American Standard Approved

Reamers, B5.14-1959 [Revision of B5.14-1949 (R1955)]

Sponsors: American Society of Tool Engineers; Metal Cutting Tool Institute; National Machine Tool Builders' Association; Society of Automotive Engineers; American Society of Mechanical Engineers

In Board of Review

Carbon and Alloy-Steel Nuts for Bolts for High-Pressure and High-Temperature Service, Specifications for, ASTM A 194-58T; ASA G38.1- (Revision of ASTM A 194-56T; ASA G38.1-1957)

Sponsor: American Society for Testing Materials

Free-Cutting Brass Rod, Bar, and Shapes for Use in Screw Machines, Specifications for, ASTM B 16-58; ASA H8.1- (Revision of ASTM B 16-52; ASA H8.1-1953)

Sponsor: American Society for Testing Materials

METALLIC COATINGS

In Standards Board

Electrodeposited Coatings of Nickel and Chromium on Steel, Specifications for, ASTM A 166-58T; ASA G53.3- (Revision of ASTM A 166-55T; ASA G53.3-1956)

Electrodeposited Coatings of Nickel and Chromium on Copper and Copper-Base Alloys, Specifications for, ASTM B 141-58; ASA G53.4- (Revision of ASTM B 141-55; ASA G53.4-1956)

Electrodeposited Coatings of Nickel and Chromium on Zinc and Zinc-Base Alloys, Specifications for, ASTM B 142-58; ASA G53.5- (Revision of ASTM B 142-55; ASA G53.5-1956)

Sponsor: American Society for Testing Materials

METALLURGY

In Board of Review

Structural Steel for Locomotives and Cars, Specifications for, ASTM A 113-58; ASA G39.1- (Revision of ASTM A 113-56; ASA G39.1-1957)

Sponsor: American Society for Testing Materials

Rolled-Copper-Alloy Bearing and Expansion Plates and Sheets for Bridges and Other Structural Uses, Specifications for, ASTM B 100-58; ASA H31.1- (Revision of ASTM B 100-55; ASA H31.1-1956)

Sponsor: American Society for Testing Materials

Leaded Red Brass (Hardware Bronze) Rod, Bar, and Shapes, Specifications for, ASTM B 140-58; ASA H33.1- (Revision of ASTM B 140-54; ASA H33.1-1954)

Sponsor: American Society for Testing Materials

In Standards Board

Zinc-Coated (Galvanized) Iron or Steel Sheets, Coils, and Cut Lengths, Specifications for, ASTM A 93-58T; ASA G8.2- (Revision of ASTM A 93-55T; ASA G8.2-1956)

Sponsor: American Society for Testing Materials

Mild- to Medium-Strength Carbon-Steel Castings for General Application, Specifications for, ASTM A 27-58; ASA G50.1- (Revision of ASTM A 27-57; ASA G50.1-1958)

Sponsor: American Society for Testing Materials

Slab Zinc (Spelter), Specifications for, ASTM B 6-58; ASA H24.1- (Revision of ASTM B 6-49; ASA H24.1-1949)

Sponsor: American Society for Testing Materials

MISCELLANEOUS

American Standard Approved

Sieves for Testing Purposes (Wire Cloth Sieves, Round-Hole and Square-Hole Screens or Sieves), Specifications for, ASTM E 11-58T; ASA Z23.1-1959 (Revision of ASTM E 11-39; ASA Z23.1-1939)

Sponsors: American Society for Testing Materials; National Bureau of Standards

In Standards Board

Indexes, Basic Criteria for, Z39.4-

Sponsor: Council of National Library Associations

ASTM Thermometers, Specifications for, ASTM E 1-58; ASA Z71.1- (Revision of ASTM E 1-57; ASA Z71.1-1958)

Sponsor: American Society for Testing Materials

PHOTOGRAPHY

American Standards Approved

Microfilm Readers for 16mm and 35mm Film on Reels, Specifications for, PH5.1-1959 (Revision of Z38.7.9-1946)

Sponsor: American Library Association

16mm Azimuth Test Film Magnetic Type, PH22.114-1959

Sponsor: Society of Motion Picture and Television Engineers

In Board of Review

Photographic Dry Plates (Inch and Centimeter Sizes), Dimensions for, PH1.23- (Revision of PH1.23-1956)

Sponsor: Photographic Standards Board

Reaffirmation Approved

Designation of Emulsion Side of Photographic Sheet Films, PH1.19-1944 (R1959)

Sponsor: Photographic Standards Board

PIPE AND FITTINGS

In Board of Review

Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service, Specifications for, ASTM A 182-58T; ASA G37.1- (Revision of ASTM A 182-57T; ASA G37.1-1958)

Sponsor: American Society for Testing Materials

Forged or Rolled Steel Pipe Flanges, Forged Fittings, and Valves and Parts for General Service, Specifications for, ASTM A 181-58T; ASA G46.1- (Revision of ASTM A 181-57T; ASA G46.1-1958)

Sponsor: American Society for Testing Materials

Seamless Copper Water Tube, Specifications for, ASTM B 88-58; ASA H23.1- (Revision of ASTM B 88-55; ASA H23.1-1956)

Sponsor: American Society for Testing Materials

Seamless Copper Pipe, Standard Sizes, Specifications for, ASTM B 42-58; ASA H26.1- (Revision of ASTM B 42-57; ASA H26.1-1958)

Sponsor: American Society for Testing Materials

In Standards Board

Petroleum Refinery Piping B31.3- (Partial revision of Section 3 of Code for Pressure Piping, B31.1-1955)

Oil Transportation Piping, B31.4- (Partial revision of Section 4 of Code for Pressure Piping, B31.1-1955)

Sponsor: American Society of Mechanical Engineers

Forged or Rolled Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service, Specifications for, ASTM A 105-58T; ASA G17.3- (Revision of ASTM A 105-57T; ASA G17.3-1958)

Sponsor: American Society for Testing Materials

Nickel Seamless Pipe and Tube, Specification for, ASTM B 161-58T; ASA H34.1- (Revision of ASTM B 161-49T; ASA H34.1-1955)

Nickel-Copper Alloy Seamless Pipe and Tube, Specification for, ASTM B 165-58T; ASA H34.2- (Revision of ASTM B 165-49T; ASA H34.2-1955)

Nickel-Chromium-Iron Alloy Seamless Pipe and Tube, Specification for, ASTM B 167-58T; ASA H34.3- (Revision of ASTM B 167-49T; ASA H34.3-1955)

Sponsor: American Society for Testing Materials

RUBBER

In Standards Board

Sample Preparation for Physical Testing of Rubber Products, Methods of, ASTM D 15-58T; ASA J1.1- (Revision of ASTM D 15-57T; ASA J1.1-1958)

Sponsor: American Society for Testing Materials

WOOD AND WOOD PRESERVATIVES

In Standards Board

Round Timber Piles, Specifications for, ASTM D 25-58; ASA O6.1- (Revision of ASTM D 25-55; ASA O6.1-1958)

Sponsor: American Society for Testing Materials

NEWS ABOUT PROJECTS

Code for Pressure Piping, B31—

Sponsor: The American Society of Mechanical Engineers

Interpretation submitted by sponsor.

From time to time certain actions of Sectional Committee B31 are published for the information of interested parties. While these do not constitute formal revision of the code, they may be utilized in specifications, or otherwise, as representing the considered opinions of the committee.

Pending revision of the Code for Pressure Piping, American Standard B31.1-1955, the sectional committee has recommended that ASME, as sponsor, and ASA publish selected interpretations so that industry may take immediate advantage of corresponding proposed revisions. Cases No. 26 (Reopened), 34 (Reopened), 35, 36, 37, 38, 39, and 40 are published herewith as interim actions of Sectional Committee B31 on the Code for Pressure Piping that will not constitute a part of the Code until formal action has been taken by the ASME and American Standards Association.

CASE NO. 26 (REOPENED)

(See MAGAZINE OF STANDARDS, August 1957, page 250, for original publication of Case No. 26.)

Modify inquiry to read: " . . . for piping of aqueous-type reactors in nuclear energy installations . . ."

Revise reply as follows:

(1) *Add the sentence:*

The minimum carbon content of type 304 material and the maximum carbon content of type 304L material shall be 0.035 percent by check analysis.

(2) *Replace present wording with the following:*

If welding is employed, all completed welds shall be inspected as follows:

(a) All longitudinal welds shall be fully radiographed.

(b) All circumferential welds shall be fully radiographed wherever possible.

(c) Where the size or configuration of the weld does not permit radiographing, it shall be examined by the fluid-penetrant method.

(d) Provisions (a) through (c) do not apply for services at or near the ordinary range of atmospheric temperatures, where these materials are employed primarily for their corrosion resistance, provided the piping is hydrostatic tested at 1½ times the maximum allowable working pressure for the piping used.

CASE NO. 34 (REOPENED)

(See MAGAZINE OF STANDARDS, January 1959, page 30, for original publication of Case No. 34.)

Revise reply to read:

Reply: It is the opinion of the committee that austenitic steel pipe conforming to ASTM Specification A-376, types 304, 316 and 348, and to ASTM Specification No. A-358, types 304, 316, 321, 347 and 348, may be used for conventional service under Section 1 of the Code

for Pressure Piping with the accompanying allowable stress values. [Stress values remain as before (MAG OF STDS, January 1959.)]

CASE NO. 35

Inquiry: Table 2A of the Code for Pressure Piping (American Standard B31.1-1955), Section 1, lists pipe to ASTM Specification A-155 but does not specify flange or firebox quality. What was intended?

Reply: It is the opinion of the committee that firebox quality is intended, and that the accompanying allowable stress values and footnote (sec. Table for Case No. 35) should replace the values listed in the 1955 edition.

CASE NO. 36

Inquiry: In Par. 123 of American Standard B31.1-1955, relative to short-time variations of pressure and temperature, how should these variations be treated?

Reply: It is the opinion of the committee that Paragraph 123 should read as follows:

123 *Variations in Pressure and Temperature.*

(a) Piping systems shall be considered safe for operation if the maximum sustained pressure and temperature on any part do not exceed the design pressure and temperature under this Code for all component parts of the system. It is recognized that variations in pressure and temperature inevitably occur and, therefore, the piping system shall be considered safe for occasional operation for short periods at higher than the design pressure and temperature.

(b) Either pressure or temperature, or both, may exceed the design values if the stress in the pipe wall calculated by Formula 1, Par. 122, using the maximum expected pressure during the variation does not exceed the *S*-value allowable for the maximum expected temperature during the variation by more than the following allowances for the periods of duration indicated:

(1) Up to 15 percent increase above the *S*-value during 10 percent of the operating period;

(2) Up to 20 percent of the *S*-value during one percent of the operating period.

CASE NO. 37

Inquiry: The June 1958 MECHANICAL ENGINEERING on page 119 contains a proposed revision of Par. P-23(a) and (b) of Section I of the ASME Boiler and Pressure Vessel Code relative to *C* factor. Is similar action contemplated for Par. 122, Section 1, of American Standard B31.1-1955?

Reply: It is the opinion of the committee that Par. 122, Section 1, of American Standard B31.1-1955 should be changed as follows:

Par. 122(a), change the definition of C to read:

C = allowance for threading and minimum structural stability, in inches.

Par. 122(b), revise to read:

(b) The values of *C* listed below do not include any allowance for corrosion and/or erosion, and additional thickness should be provided where they are expected. The allowance for threading and minimum structural stability are not intended to provide for extreme conditions of misapplied external loads or for mechanical abuse.

The value of *C* in Formula 1 shall not be less than that given for the respective material in the following list:

TYPE OF PIPE	VALUE[5] OF *C* IN INCHES
Cast Iron Pipe, centrifugally cast	0.14
Cast Iron Pipe, pit cast	0.18
Threaded steel, wrought iron or nonferrous	
3/4" and smaller	0.065
1" and larger	Depth of thread
Grooved steel, wrought iron or nonferrous	Depth of groove plus 1/64
Plain end[6] steel or wrought iron, up to and including 3½"	0.065
Plain end[6] steel or wrought iron 4" and larger	0.000
Plain end[6] nonferrous	0.000

CASE NO. 38

Inquiry: May piping components made of Nodular Cast Iron and to the dimensions of American Standards B16.1, B16b and B16.5 be used in construction under the jurisdiction of Sections 1, 2 and 3 of the Code for Pressure Piping (American Standard B31.1-1955)?

Reply: It is the opinion of the committee that, pending the completion of studies now in progress in Sectional Committees B16 and B31, Nodular Cast Iron components made of material conforming to ASTM Specification A395-56T may be used under the sections indicated

Table for Case No. 35

Material	*ASTM Spec*	*Grade*	*Tensile Strength Min*	*Values of S psi for temperatures in deg F not to exceed*								
				−20 to 650	*700*	*750*	*800*	*850*	*900*	*950*	*1000*	*1050*	*1100*
Electric Fusion Welded:													
Carbon Steel	A155[2]	C45	45000	10100	9800	8750	7500	5950					
		C50	50000	11250	10900	9900	8450	6550					
		C55	55000	12400	11900	10850	9200	7000					
Killed Carbon Steel		KC55	55000	12400	11900	10850	9200	7000					
		KC60	60000	13500	12900	11650	9700	7000					
		KC65	65000	14600	13950	12450	10250	7000					
		KC70	70000	15750	14950	13300	10800	7000					
Carbon Molybdenum Steel		CM65	65000	14600	14600	14600	14100	12950	11250				
		CM70	70000	15750	15750	15750	15200	13500	11500				
		CM75	75000	16900	16900	16900	16200	14300	11700				
1/2 Cr, 1/2% Mo Steel		1/2 CR	65000	14600	14600	14600	14100	12950	11250	9000	5600		
1% Cr, 1/2% Mo Steel		1 CR	60000	13500	13500	13500	13300	12800	11800	9900	6750	4500	2500
1 1/4 Cr, 1/2 Mo Steel		1 1/4 CR	60000	13500	13500	13500	13500	12950	11800	9900	7000	4950	3600
2 1/4% Cr, 1% Mo Steel		2 1/4 CR	60000	13500	13500	13500	13500	12950	11800	9900	7000	5200	3800

Note 3—The values tabulated apply to firebox quality material and to Class 2 pipe. For Class 1 pipe, which is heat treated and radiographed, these stresses may be increased by the ratio of 0.95 divided by 0.90.

in the inquiry under the following conditions:

(a) Components whose dimensions conform to American Standards B16.1-1948 and B16-1944 may be used at the following maximum pressure-temperature ratings at temperatures between –20F and 650 F.

DIMENSIONS USED	MAXIMUM RATING
Class 125 C.I. (B16.1)	80% of 150 lb Carbon Steel (B16.5)
Class 250 C.I. (B16b)	80% of 300 lb Carbon Steel (B16.5)
150 to 600 lb Steel, inclusive	80% of Carbon Steel rating

These ratings are applicable to valves providing that the valves in other respects merit these ratings. It is recognized that components made to the Class 125 and Class 250 standards or to API Std 600 may be heavier than those made to the 150-lb and 300-lb standards, respectively. In the case of these heavier components the additional wall thickness may be considered as additional correction allowance.

(b) Until further experience is developed, the pressure at operating temperature shall not exceed 1000 pounds per square inch (psi.)

(c) Welding of the components is not employed in fabricating them in an assembled system.

(d) They shall not be used in lethal service, as defined in each of the sections indicated in the inquiry.

CASE NO. 39

Inquiry: May type 304 stainless steel be used in nuclear energy installations handling liquid sodium and sodium-potassium mixtures under the rules of Section 1 of the Code for Pressure Piping (American Standard B31.1-1955)?

Reply: It is the opinion of the committee that type 304 stainless steel may be used in nuclear energy installations handling liquid sodium and sodium-potassium mixtures for construction under Section 1, provided the following conditions are observed:

(1) The materials shall at least conform to one of the following specifications:

Pipe	ASTM-A-376 ASTM-A-358-56T
Welding fittings	ASTM-A-403
Forgings	ASTM-A-182

The minimum carbon content of all material shall be 0.035 percent by check analysis.

(2) If welding is employed, all completed welds shall be inspected as follows:

(a) All longitudinal welds shall be fully radiographed.

(b) All circumferential welds shall be fully radiographed wherever possible.

(c) Where the size or configuration of the weld does not permit radiographing, it shall be examined by the fluid penetrant method.

(3) The allowable stress values for seamless materials shall be as follows:

TEMPERATURE, F	*S* VALUE
–20 to 100	18,750
200	16,650
300	15,000
400	13,650
500	12,500
600	11,600
650	11,200
700	10,800
750	10,400
800	10,000
850	9,700
900	9,400
950	9,100
1,000	8,800
1,050	8,500
1,100	7,500
1,150	5,750
1,200	4,500
1,250	3,250
1,300	2,450
1,350	1,800
1,400	1,400
1,450	1,000
1,500	750

(4) A joint factor of 0.95 shall be applied to longitudinal welds which have been fully radiographed.

CASE NO. 40

Inquiry: Section 1 of the Code for Pressure Piping (American Standard B31.1-1955) does not mention reinforced concrete pipe. May such piping be used under Section 1?

Reply: It is the opinion of the committee that, although the Code does not contain rules for the design of reinforced concrete pipe, pipe complying with the following specifications may be used for service water and condensing water systems at 43 psi and below at the ratings assigned in the specifications:

AWWA C-300—Reinforced Concrete Water Pipe—Steel Cylinder Type—Not Prestressed

AWWA C-301—Reinforced Concrete Water Pipe—Steel Cylinder Type—Prestressed

AWWA C-302—Reinforced Concrete Water Pipe—Noncylinder Type—Not Prestressed

Federal Spec SS-P-381 Pipe—Pressure, Reinforced Concrete, Pretensioned Reinforcement (Steel Cylinder Type)

Common Names for Food Additives

On behalf of the Food Law Institute, the Food and Drug Research Laboratories have asked the American Standards Association to consider organizing a project to develop American Standard common names for food additives. ASA has been asked to call a conference of the organizations concerned to discuss this proposal. The request has been endorsed by the Food and Drug Administration and the U. S. Department of Agriculture.

Rotating Electrical Machinery, C50—

Sponsor: Electrical Standards Board

The Subcommittee on Motors for Naval Vessels, established at the request of the Bureau of Ships, reports good progress in coordinating the viewpoints of the motor industry, the shipbuilding industry, and the Bureau of Ships. Specifically, the subcommittee has reviewed the Department of Defense Specification MIL-M-17060 on alternating-current motors, and MIL-P-17840 on close-coupled pumps. The Bureau of Ships has been assigned responsibility for the standardization of motors for all uses within the Department of Defense, and the work of this subcommittee is contributing to the progress of this program.

As a result of the subcommittee's study, numerous changes have been made in the specification MIL-M-17060. These changes, the committee believes, will all be in the interest of fitting the manufacture of Navy motors into the motor manufacturing facilities of the country and should result in higher quality as well as less delay in producing such motors. It is expected that the revised specification probably will be available in May 1959.

Work on MIL-P-17840, Close-Coupled Pumps, is still going forward.

The subcommittee plans to start a review of Specification MIL-M-17413, Direct-Current Motors, at its next meeting, which will probably be held in Washington some time in May.

Street and Highway Lighting, D12—

Sponsor: Illuminating Engineering Society

Results of an eight-year program

of research at the University of Michigan have brought out a new basis for recommendations for street and highway lighting. The Roadway Committee of the Illuminating Engineering Society is studying the results and is having measurements made for application to streets and highways. When the study is completed, a draft revision of the American Standard Practice for Street and Highway Lighting, D12.1-1953, will be submitted to other organizations concerned for their recommendations to the American Standards Association concerning approval as American Standard.

Library Work and Documentation, Z39—

Sponsor: Council of National Library Associations

"News About Z39" is the title of a four-page bulletin which was circulated to the committee in March. This news sheet will be issued by the chairman of the committee from time to time to let committee members know about developments within the scope of their activities. The current edition announces new members of the committee.

Dr Burton W. Adkinson, the National Science Foundation's representative on Z39, has been elected vice-president of the International Federation for Documentation, it is announced. News about ISO/TC 46 on Documentation is also included. Z39 is the committee which formulates the U. S. viewpoint on the work of ISO/TC 46.

The work of other national and international organizations related to the work of Committee Z39 or that might be coordinated with it is also mentioned. For example, under a grant from the Council on Library Resources, the American Library Association is launching a standards program on library supplies and equipment. Eventually, ALA hopes to establish a testing laboratory and a continuing research program. Also, the World Meteorological Organization has decided to use the International Organization for Standardization's system for the transliteration of Cyrillic characters in all meteorological documents and publications circulated internationally. This is the system given in ISO Recommendation R9, prepared by ISO/TC 46.

by **Cyril Ainsworth**

DINNSA

(Does Industry Need a National Standards Agency?)

IN THE DISCUSSION of the fundamentals of ASA procedure contained in paragraph 101, we come to the method of test to be applied as set forth in the fourth sentence:

> "The basic test to be applied in all cases is the fact of the assent, affirmatively expressed, of the groups having substantial concern with the standard."

There are several points about this sentence that are especially worthy of note.

One is that no percentage of vote is specified. How many groups must affirmatively express their assent or what percent of the groups concerned must accept the standard in order that ASA can approve it are questions that are constantly asked. Numbers mean something but not everything. If a group substantially concerned refuses to affimatively express its assent for reasons that it believes to be technically sound, or fails to express itself affirmatively or negatively, then ASA must weigh these circumstances to determine if they prevent the declaration of the existence of a consensus. The only rules in the procedures govern the evidence that must be provided to assist ASA in exercising its judicial function. There is nothing more to go on.

Applying the test method, therefore, is not a perfunctory matter. Thoughtful and careful judgment must be exercised. This is first done at the standards board level. The individual members of the standards boards must, in applying the test, look beyond the particular interest of the group they represent and examine the evidence from the viewpoint of the interest of all, carefully weighing the evidence to determine if the negative votes or the lack of votes by concerned groups weigh heavily enough to over-balance the affirmative votes and thereby indicate the lack of a consensus.

The action of the standards board does not end the matter. If the standard is not recommended for approval because of the lack of a consensus, it is returned to the organization, committee, or conference that developed it, together with the reasons for the inability to find that a consensus had been reached. Additional work can then be undertaken to remove the circumstances that prevented approval.

In the event that the standards board finds that a consensus exists and it recommends that the standard be approved as American Standard, its recommendation is reviewed by the Board of Review, composed of six members elected by the Standards Council from its own membership. This is a final check to make sure that the standards board did not overlook any evidence bearing on the question of a consensus. If the Board of Review finds that it cannot agree with the recommendation of the standards board, the case is returned to the standards board for further investigation. If the Board of Review agrees with the recommendation, it applies the designation "American Standard" and the standard is thereby fully approved by ASA. All of these decisions can be appealed by any organization that so desires. The appeals are heard by the Standards Council and its decision is final.

This judicial process of determining the existence of a consensus is what makes the designation "American Standard" meaningful to those desiring to use a standard so designated. It makes the standard stand out above all others that may exist in its field. It gives authority to the recommendations contained in the standard. Thus, ASA performs a very special and valuable service to all concerned with the standardization process.

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